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ABSTRACT

This report provides a handbook of format models, based on learning principles, for use in constructing training materials for the following types of tasks common to Navy jobs: (1) performing procedures; (2) recalling facts about equipment; (3) applying rules and regulations; (4) classifying objects and signals; and (5) recognizing and drawing symbols. Each of five format models shows the kind of information to present for a specific class of tasks, how to format the information, and how to sequence it. The model serves as a specification for creating the types of pages required for efficient training. For each format model, there are sample learning objectives, a description of the learning strategy incorporated in the model, and one or more sample instructional modules based on the page specifications. An appendix to the document contains a sample instructional package developed by a field activity based on two of the format models. This package demonstrates that field activities can successfully use the format models and illustrates how the format models can be customized to meet special requirements in a training program. (This handbook was specifically prepared for use in developing instructional material according to the Navy's "Procedures for Instructional Systems Development." Therefore, it will be of major interest to subject matter specialists in Navy schools who create instructional materials, as well as to a wider audience of designers of materials for technical instruction.) (Author/KC)

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Technical Report 129

HANDBOOK OF FORMAT MODELS FOR DESIGNERS OF TECHNICAL TRAINING MATERIALS

Richard Braby
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Training Analysis and Evaluation Group

August 1982

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The format models in this handbook evolved from the testing of various types of formats in the schools of the Navy's Service School Command, Orlando, Florida. Specifically, a preliminary version of the Performing Procedures format model was evaluated in the Basic Electricity and Electronics School; a version of the format model for Recognizing and Drawing Symbols was tested in the Signalman "A" School; and the format models for Recalling Facts About Equipment, Applying Rules and Regulations, and Classifying Objects and Signals were evaluated in the Quartermaster "A" School. Results of these evaluations were published in previous TAEG reports. School personnel who directly supported each of these evaluations have been acknowledged in the appropriate previous report. The constant support provided the project by the Service School Command, Orlando, was exceptional, and the encouragement and cooperation of William Shoen, Senior Education Advisor at the command is expressly acknowledged.

Appreciation is also extended to Ralph Rotzer of the Naval Technical Training Center, Corry Station, Florida, and to CTM2 Pamela Tornow, formerly of that training center. They were among the first training material designers to employ the TAEG format models. Their success in producing useful materials based on these models was encouraging and their recommendations influenced the final design of these models. Permission to use pages from one of their modules as the appendix in this handbook made it possible to demonstrate how one command adapted the models for its own needs.

The support provided by the various training officers in Helicopter Antisubmarine Squadron One, Naval Air Station, Jacksonville, has also been laudable, and the work accomplished by AW1 Robert Pulos of that squadron, in using one of the format models in developing training materials for the preflight of the SH-3H Sonar has been singularly effective. Pages from this work have been included in this handbook to illustrate the Performing Procedures format model employed in an operational environment.

Finally, we are pleased to acknowledge the counsel and encouragement during the final phase of the project of Homer Adkins of the Training Systems Management Branch of the Naval Education and Training Command. Mr. Adkins was instrumental in incorporating the basic TAEG format models into the Navy's Procedures for Instructional Systems Development (NAVEDTRA 110A, 1981).

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Substantial evidence indicates that significant training gains can be made through the systematic application of learning principles in the design of learning packages. This report provides a handbook of format models, based on learning principles, for use in constructing training materials for the following types of tasks common to Navy jobs:

(continued on reverse side)

20. ABSTRACT (continued)

- performing procedures
- recalling facts about equipment
- applying rules and regulations
- classifying objects and signals
- recognizing and drawing symbols.

Each format model shows the kind of information to present for a specific class of task, how to format the information, and how to sequence it. The model serves as a specification for creating the types of pages required for efficient training.

For each format model there are sample learning objectives, a description of the learning strategy incorporated in the model, and one or more sample instructional modules based on the page specifications.

This handbook was specifically prepared for use in developing instructional material according to the Navy's Procedures for Instructional Systems Development (NAVEDTRA 110A). Therefore, it will be of major interest to the subject matter specialists in Navy schools tasked to create instructional materials and the instructional technologists at the Navy's Instructional Program Development Centers as well as to contractors who prepare training materials to support the operation and maintenance of equipment being introduced into the Navy. In addition, the handbook is of general utility to a wider audience, particularly to designers of materials for technical instruction.

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SECTION I

INTRODUCTION

The manner in which job-task information is organized and presented to students affects both the cost and the effectiveness of training programs. Specifically, this influences the cost of producing instructional materials, the time required for students to learn, and how much of the learning transfers to the job.

One way of enhancing the design of job training materials is to systematically apply well-documented learning principles in presenting information to be learned. Traditionally, authors of learning packages failed to take advantage of many useful learning principles in the design and sequencing of learning events, much to the detriment of the instructional program. Substantial evidence has been assembled in the Training Analysis and Evaluation Group (TAEG) to indicate significant training gains can be made through the systematic application of learning principles in the design of learning packages. Therefore, the development of techniques for guiding instructional designers in applying these principles has merit.

This awareness encouraged the Chief of Naval Education and Training (CNET) to task the TAEG to develop ways to improve the presentation of job task information for training.[1] The initial work begun in 1974 developed an approach for estimating cost and training effectiveness of proposed training systems (Braby, Henry, Parrish, and Swope, 1975). Aagard and Braby (1976) continued this effort by summarizing the learning principles applicable to the training of 11 common types of military job-tasks. This summary provided training system designers guidance in creating learning events responsive to a set of learning principles selected for the specific type of task to be learned. These principles were presented as a series of guidelines. Algorithms (in the form of flow charts) were developed which emphasized the sequencing of events described in the learning guidelines.

The guidelines and algorithms were incorporated into the Interservice Procedures for Instructional Systems Development, NAVEDTRA 106A (1975)[2] to assist curriculum developers in the design and sequencing of events according to principles of learning. These were not widely accepted despite NAVEDTRA 106A urging their use. Old formats were not easily discarded and designers apparently considered the guidelines too complex, too abstract, and too time consuming to follow. Applying them would cause too much change to the traditional ways of presenting and sequencing instruction. Authoring aids were required to make the comprehensive application of learning principles common practice, easier to understand and use. The new task was to build these authoring aids for systematic use in instructional design.

[1]The initial tasking for this programmatic effort began in 1974; the current tasking commenced in April 1980 (CNET ltr Code N-53 of 24 April 1980).

[2]R. K. Branson, G. T. Rayner, J. L. Cox, J. P. Furman, F. J. King, and W. H. Hannum are the authors of the IPISD manual. These authors incorporated the guidelines and algorithms developed by Aagard and Braby (which were subsequently published by TAEG in 1976) into the manual.

The development of the authoring aids began with the construction of instructional material based on the above cited learning guidelines. Materials were created for five types of learning tasks. These materials were then subjected to field tests or were evaluated by students and instructors. Descriptions of these tests and evaluations are presented in section VIII of this report. The field tests demonstrated that the materials formatted according to the learning guidelines and algorithms described in Aagard and Braby (1976) produced significantly greater learning gains when compared with traditionally formatted materials. The expectation was substantiated: instructional materials designed according to a comprehensive set of learning principles are more effective than materials arranged without systematic employment of these principles.

The field-tested materials noted above served as the starting point in the development of the format models[3] contained herein. These format models have been adopted by two large Navy training programs. First, the Naval Education and Training Command has included a preliminary version of the format models in its most recent instruction, Procedures for Instructional Systems Development, NAVEDTRA 110A (1981). This instruction directs that the format models be used for difficult to learn tasks where traditional formats would not provide the needed training. Second, the Naval Technical Information Presentation Program (NTIPP) of the David W. Taylor Naval Ship Research and Development Center has adopted the format models as one element in a state-of-the-art Navy publishing system designed for use in preparing four types of documentation for new equipment; i.e., operator, maintenance, training, and logistic support handbooks. The NTIPP publishing system is scheduled to be operational in 1985. The format models will be used by contractors in preparing special skills training packages on new Navy equipment.

While the earlier version of the format models presented in the recently promulgated NAVEDTRA 110A specified the content and layout for different types of pages, it did not provide sample instructional materials developed according to the format models. The learning strategies carried out within the models were not explained. In addition, some of the models described in NAVEDTRA 110A have been refined based on the results of recent field tests and evaluations. For these reasons, an expanded publication of fully developed format models is needed. The present report is a contribution to this need.

PURPOSE

This report provides a handbook of format models for use in constructing training materials for five types of tasks common to Navy jobs. Also provided are examples of material prepared in accordance with these format models.

This handbook has been specifically prepared for use in developing instructional material according to the Navy's Procedures for Instructional

[3]A format model shows the kind of information to present for a specific class of task, how to format this information, and how to sequence it.

Systems Development, NAVEDTRA 110A. As such, it is envisaged to be of major interest to the subject matter specialists in Navy schools and the instructional technologists at the Navy's Instructional Program Development Centers (IPDCs) who prepare training materials, as well as to contractors who prepare training materials to support the operation and maintenance of equipment being introduced into the Navy. In addition, the handbook is of general utility to a wider audience, particularly to designers of materials for technical instruction.

ORGANIZATION OF THIS REPORT

In addition to this introduction, the report contains seven sections and one appendix. Section II describes the process of using format models, including the strengths and limitations of this process. Sections III through VII sequentially present the five format models. For each format model there are sample learning objectives, a description of the learning strategy incorporated in the model and one or more sample instructional modules based on the model. Section VIII reports observations to date on the use of the models in various Navy training schools. An appendix contains a sample instructional package developed by a field activity based on two of the format models. This package demonstrates that field activities can successfully use the format models, and illustrates how the format models can be customized to meet special requirements in a training program.

SECTION II

USING FORMAT MODELS

This section describes the process for deciding when and how to use format models. The steps in the process are shown in figure 1. This process begins with the identification of learning objectives, specifically those requiring substantial drill and practice for their mastery. In these situations where the application of format models is called for, steps are presented to identify which format models to use. When format models have been selected, the final phase of the process is to prepare draft material based on the models, test the materials, and then modify both the format models and draft materials as required. A description of each of the numbered boxes in figure 1 follows.

1. Determine if drill and practice exercises are needed to accomplish the learning objective. The specific concerns are:

- Does the objective call for the student to perform a skill on the job without detailed job aids?
- Will learning require more time and effort than merely reading a passage of text and answering simple questions about the passage?

If the conditions expressed in step 1 exist, then traditional methods of presenting information for training may not be sufficient. In these instances, format models incorporating drill and practice exercises may describe useful ways for presenting the information. For instance, the information may need to be systematically divided into easily learnable segments, as called for in the format models. Also, some information may need to be organized into exercises in ways to aid students in practicing difficult discriminations, or in chaining the performance of individual steps into a smooth sequence of steps.

While students of all aptitudes benefit from improved presentation of information, students with below average aptitude for academic learning find presentations configured according to the TAEG format models to be especially useful.

2. Use traditional methods of instruction or job aids. This applies if drill and practice exercises are not needed. Where the learning tasks are not demanding and the new behavior is easily acquired by reading a passage of text, use the traditional narrative type of instructional materials. For these non-demanding tasks, students will reject instructional materials based on complex formats. Also, the resources required to build complex exercises could better be spent in more demanding parts of the curriculum.

3. Determine if an appropriate format model exists. This applies if drill and practice exercises are needed. Format models show ways of organizing information for initial learning and for practice in recalling and applying

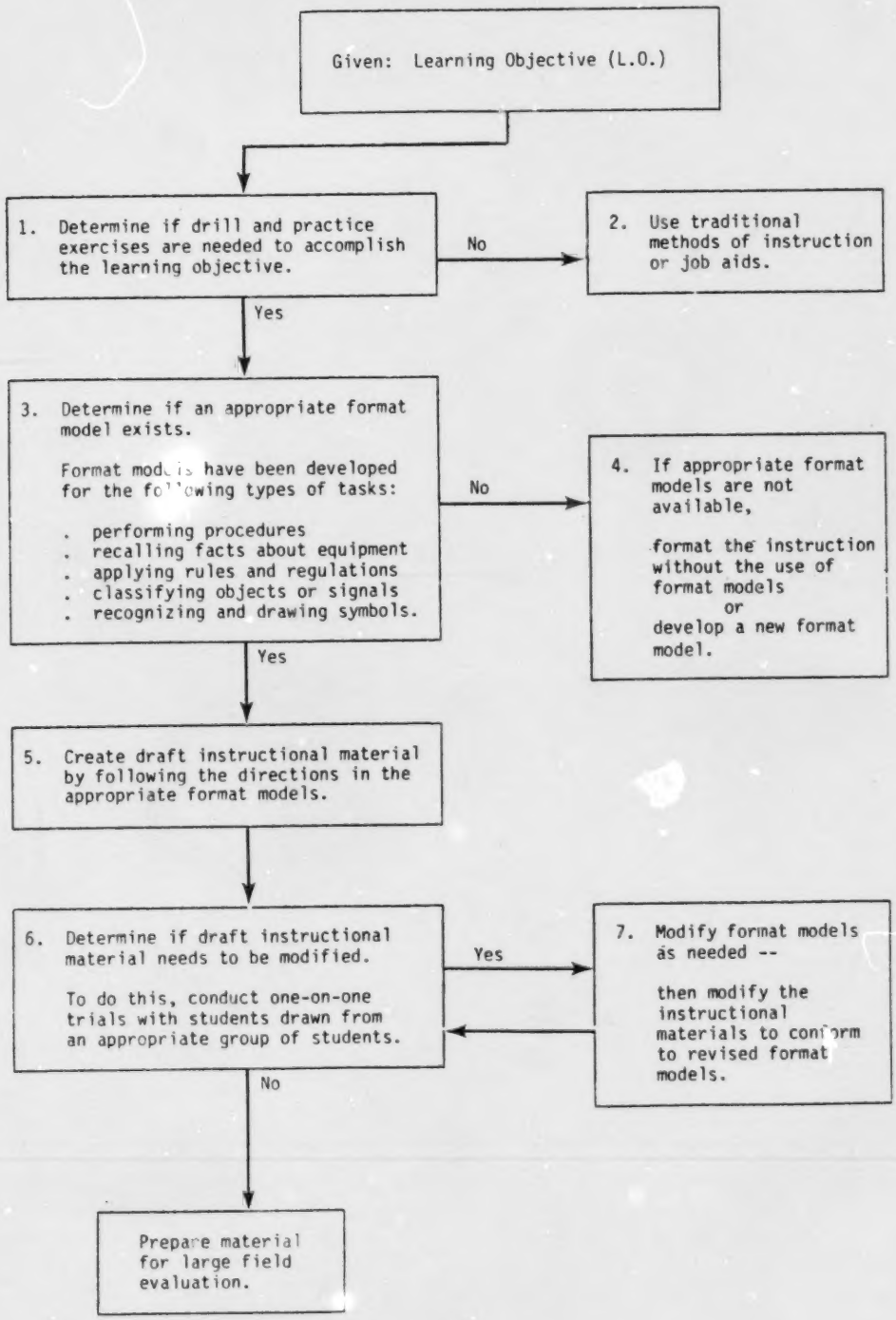

Given: Learning Objective (L.O.)
1. Determine if drill and practice exercises are needed to accomplish the learning objective.
No
2. Use traditional methods of instruction or job aids.
Yes
3. Determine if an appropriate format model exists.
Format models have been developed for the following types of tasks:
. performing procedures
. recalling facts about equipment
. applying rules and regulations
. classifying objects or signals
. recognizing and drawing symbols.
No
4. If appropriate format models are not available,
format the instruction without the use of format models
or
develop a new format model.
Yes
5. Create draft instructional material by following the directions in the appropriate format models.
6. Determine if draft instructional material needs to be modified.
To do this, conduct one-on-one trials with students drawn from an appropriate group of students.
Yes
7. Modify format models as needed --
then modify the instructional materials to conform to revised format models.
No
Prepare material for large field evaluation.

Figure 1. Steps in Using Format Models for Designing Technical Training Materials

the information. The types of tasks for which models have been developed are:

- performing procedures
- recalling facts about equipment
- applying rules and regulations
- classifying objects and signals
- recognizing and drawing symbols.

Subsequent sections of this report describe the types of learning tasks the format models support. Examples of learning objectives that can be supported by each format model are given. The instructional designer can determine if an appropriate format model exists for a learning task by matching his learning objective with sample learning objectives from the various format models.

4. If appropriate format models are not available, format the instruction without the use of format models, or develop a new format model. When there are clusters of similar learning objectives that are not supported by a format model, the instructional designer may wish to use traditional formats or develop special format models for each of these clusters of similar learning objectives. While the development of new format models is not supported by this handbook, the learning guidelines and algorithms presented by Aagard and Braby (1976) may be helpful in identifying learning strategies for other types of tasks.

5. Create draft instructional material by following the directions in the appropriate format models. The format models describe how to:

- divide a task into easily learned segments
- organize pages for presenting information
- construct practice exercises for recalling and applying information
- create tests providing feedback to the students on their achievement
- give directions for various types of learning operations
- mix graphics and text for types of learning tasks
- sequence information for efficient learning.

Examples of instructional materials prepared according to the format models are provided in sections III through VII as further guidance to the instructional designer.

6. Determine if the draft instructional material needs to be modified. This can be determined by conducting one-on-one trials with each phase of the instructional material as it is completed in draft form. The trials should be conducted with students drawn from a group similar to the students that will use the instructional material. The instructional designer should carefully note directions that are unclear to the students or passages that do not produce the desired learning.

7. Modify format models, as needed. Then modify the instructional materials to conform to the revised format models. This applies if one-on-one trials indicate repeated instances of specific types of learning problems.

The instructional designer determines the types of changes that need to be made in the draft manuscript. If the changes concern the clarity of directions, formats for exercises, or other characteristics defined by the format model, the instructional designer should first modify the format model, and then change the instructional material to conform to the format model. By updating the format model, the lessons learned in one phase of instructional design can be applied to similar situations elsewhere in the curriculum. Modifications to the instructional materials not guided by the format model should be made via currently accepted practices.

After the process described above has been carried through to completion, the instructional material is ready for field evaluation.

The remainder of this report provides the specific models with examples of instructional materials based on these models. In addition, operational evidence is documented indicating the usefulness of the models.

SECTION III

PERFORMING PROCEDURES

DESCRIPTION OF TASK CATEGORY

Performing a procedure requires carrying out a sequence of steps in the same way each time it is performed. If the procedure is performed without a job aid, students must remember the step sequence and the detailed actions for each step. If the procedure is performed with a simple checklist-type job aid, students must remember only the detailed actions for each sequential procedural step. The procedure learning category normally combines two different levels of learning: recalling the steps of a procedure and performing the actions required in the procedure.

Five examples of procedural performance are presented below to illustrate the types of learning objectives and the extensive description called for by this category.

1. As a member of a two-man team, DRESS a diver in a Mk 12 Surface Supported Diving System in accordance with procedures contained in the U.S. Navy Diving Manual, Volume 1, within 12 minutes, so that the diver can safely enter the water.

2. Given the maintenance manual for a specific vehicle, tools, and a set of new spark plugs (4, 6, or 8), CHANGE the spark plugs in the vehicle. The vehicle should start and idle smoothly following the operation.

3. Using the NATOPS checklist, PERFORM the normal startup procedures for the #1 engine of an SH-3H helicopter.

4. Given an IBM Selectric typewriter and a new ribbon cartridge, CHANGE the ribbon without error in accordance with the manufacturer's manual.

5. From memory, PERFORM an operational check on the Cutler Hammer Static Logic Elevator to ensure that the proper switches are engaged to limit the elevator's travel.

LEARNING STRATEGY

Principles of learning related to performing a procedure include those dealing with serial learning, response chaining, distributed practice, and feedback.

When training begins, a verbal description and a visual display of the first step is presented. Then the student is allowed to practice the step. Subsequent steps are treated in this manner. To make it easier for students to learn a complex procedure, the sequence of steps in the procedure is divided into clusters of steps, according to function, location (e.g., on a panel), or some other obvious attribute which makes the cluster meaningful and thus more easily remembered. Students are directed to mentally rehearse

the actions of each step in a cluster and then use a paper mockup of the equipment to act out the entire sequence of steps in a cluster. Students practice one cluster followed by another and then, finally, the entire procedure in a building-block manner.

During initial training, there should be immediate and frequent feedback which informs the student how the results of his/her responses conform to some objective reference. Providing achievement feedback is generally recommended for the initial stages of learning characteristic of military training. Dramatic results have been documented on the efficacy of augmented feedback schedules during early training. Generally, the more precise and relevant the information, and the more immediate the presentation, the greater the facilitating effect on performance. Guides and prompts are presented in the form of key words, arrows, and pictures to aid memory.

As training progresses and skills develop, guides and prompts and immediate feedback are reduced and eventually withdrawn until the actual job conditions prevail. Two sources of information are utilized by the student in developing skill. One source is action feedback which consists of externally displayed cues inherent in the task (e.g., the position of controls, equipment responses). The other source is intrinsic feedback which is the information the student receives from internal movements or from proprioceptive stimulation.

FORMAT MODEL

The format model outlined below demonstrates how to design instructional materials according to the procedure learning strategy. There are five separately numbered pages in this format model. Page 1 of the model illustrates how to use graphics and text to initially present the steps in the procedure. Page 2 is an exercise in recalling critical information. Branching steps in the procedure can be displayed with the format presented on page 3 (i.e., if this happens, then do this). Page 4 presents an exercise for chaining a series of steps into a smooth sequence; page 5 shows a paper mockup for use in practicing the recall of the steps in the procedure without guides and prompts. How to sequence these pages for efficient learning is also described. The sample training task used in this format model concerns the calibration of the probe of an oscilloscope. Following the format model presentation, another example is provided to show how the model can be used. In this instance the task is to teach the procedure, SH-3H SONAR INITIAL CONTROL SETTING.

FORMAT MODEL
PERFORMING PROCEDURES

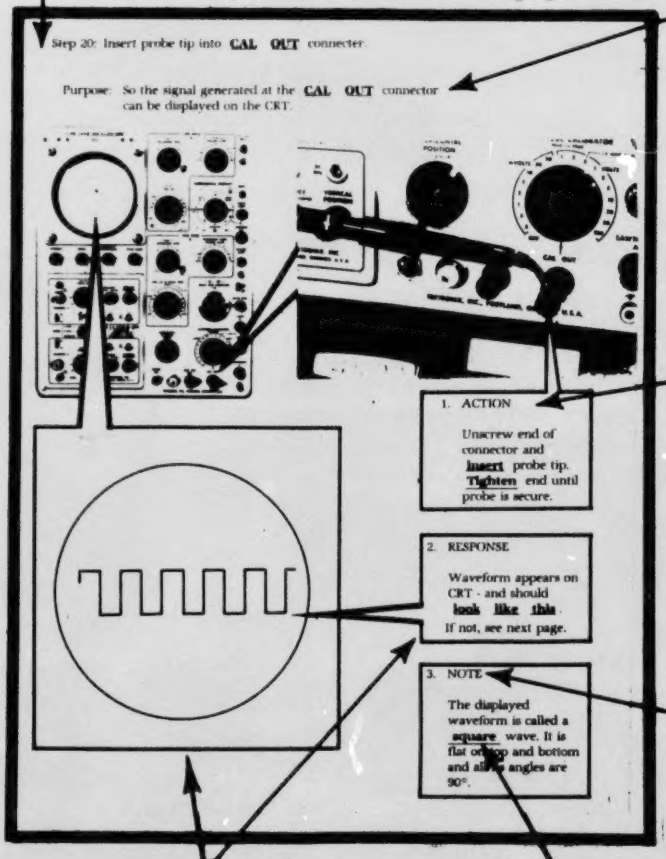
A general format for use in designing training materials which present steps of a procedure to be performed from memory.

Performing Procedures Format Model - Page 1

Use this page format to present each step in a procedure.
The purpose of this page format is to present:

- a word description of the step—emphasize human action.
- a visual display of the step—emphasize human action.
- the purpose of the step.
- the location of actions on equipment.
- the system response to actions taken.
- notes—additional needed information.

Break procedure into logical steps.
(Each step should start on a new page.)


Step 20: Insert probe tip into CAL OUT connector.
Purpose: So the signal generated at the CAL OUT connector can be displayed on the CRT.
1. ACTION
Unscrew end of connector and Insert probe tip. Tighten end until probe is secure.
2. RESPONSE
Waveform appears on CRT - and should look like this.
If not, see next page.
3. NOTE
The displayed waveform is called a square wave. It is flat on top and bottom and all the angles are 90°.

Keep purpose short and simple.

Use line drawings or photographs.

If possible, each step should have no more than 3 or 4 actions.

State Action, and Response if there is one, and any Note. Number the boxes in the order you want them read.

Use notes to present additional information that must be recalled and used on the job.

If the system makes a response that should be noted or checked, present the response.

Underline key words.

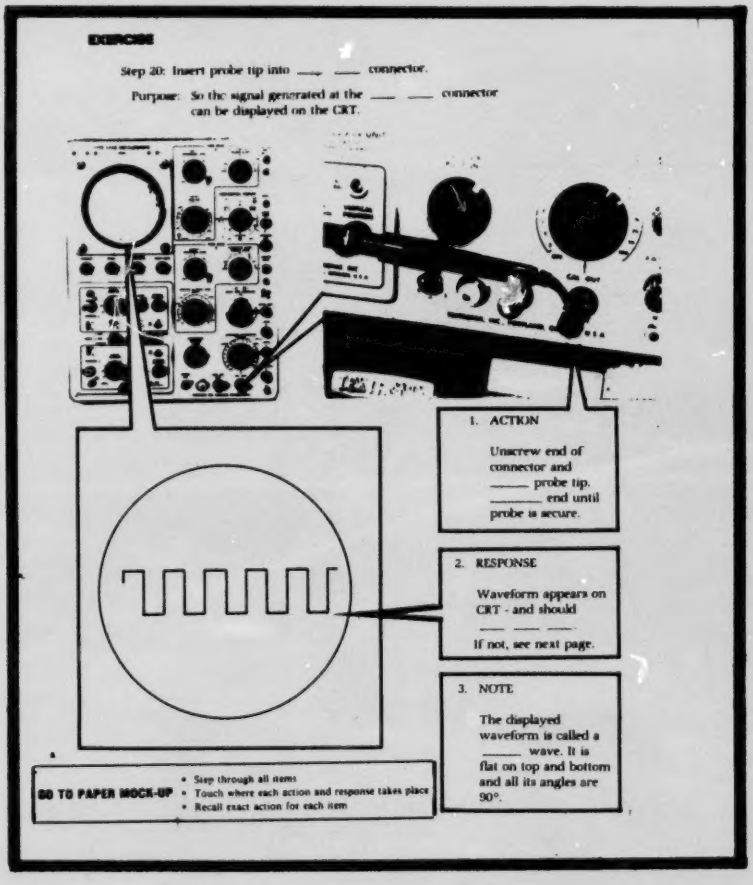
Keep pages simple, with no more than 3 or 4 boxes per page. Use additional pages if necessary.

Performing Procedures Format Model - Page 2

Use this page format immediately following each use of the page 1 format.

The purpose of this page format is to:
- provide students exercise in the recall of key words in the procedure.
- direct the students to practice the step on the paper mock-up.

Copy the previous page. Then drop out key words that were underlined on the previous page.

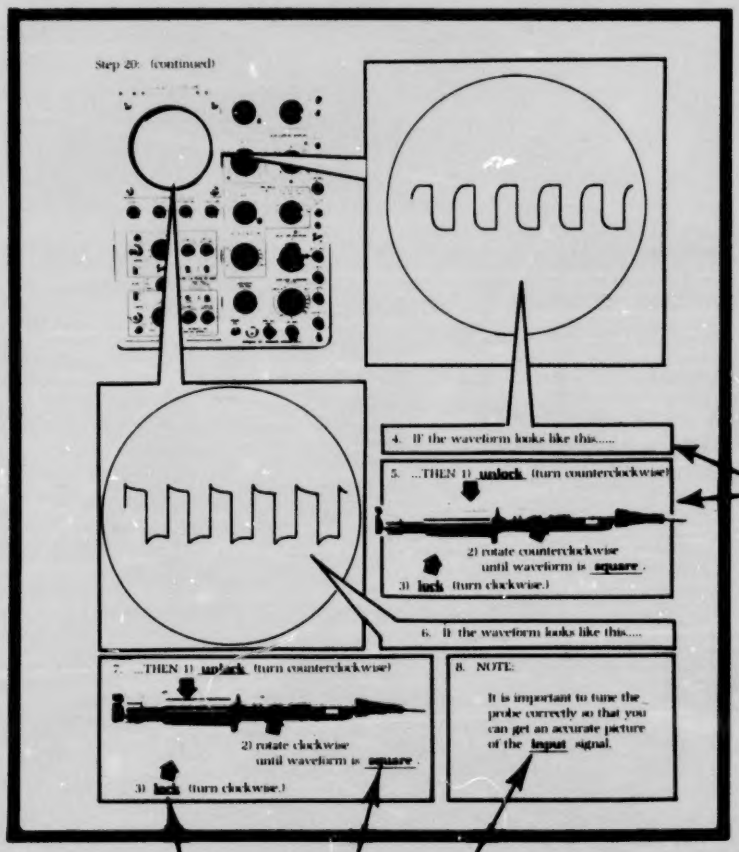

EXERCISE
Step 20: Insert probe tip into ___ ___ connector.
Purpose: So the signal generated at the ___ ___ connector can be displayed on the CRT.
1. ACTION
Unscrew end of connector and ____ probe tip. _____ end until probe is secure.
2. RESPONSE
Waveform appears on CRT - and should ___ ___ ___.
If not, see next page.
3. NOTE
The displayed waveform is called a ____ wave. It is flat on top and bottom and all its angles are 90°.
GO TO PAPER MOCK-UP
• Step through all items
• Touch where each action and response takes place
• Recall exact action for each item

Add directions requiring students to go to the paper mock-up to practice the step.

Performing Procedures Format Model - Page 3

Use this If/Then page to describe simple branches in a procedure.

The purpose of this page format is to:
- describe a special condition that changes the normal procedure.
- describe the action to respond to the special condition.


Step 20: (continued)
4. IF the waveform looks like this.....
5. ...THEN 1) unlock (turn counterclockwise)
2) rotate counterclockwise until waveform is square.
3) lock (turn clockwise.)
6. If the waveform looks like this.....
7. ...THEN 1) unlock (turn counterclockwise)
2) rotate clockwise until waveform is square.
3) lock (turn clockwise.)
8. NOTE:
It is important to tune the probe correctly so that you can get an accurate picture of the input signal.

For any additional Responses and Actions, use the IF . . . THEN format.

Continue to underline key words.

Performing Procedures Format Model - Page 4

Use this page after presenting each set of 3 to 7 steps in a procedure.

The purpose of this page format is to provide a finger tracing exercise to aid students in recalling a sequence of steps.

For each cluster of 3 to 7 steps, present a Road Map showing how the steps are chained together.

ROAD MAP
• With your finger, trace the steps
• Recall (1) how to perform, (2) systems response
• Look up answers if you need help
• Keep practicing until you can describe steps without error or hesitation
TYPE 5488 OSCILLOSCOPE
GO TO PAPER MOCK-UP
• Step through all items
• Touch where each action and response takes place
• Recall exact action for each item

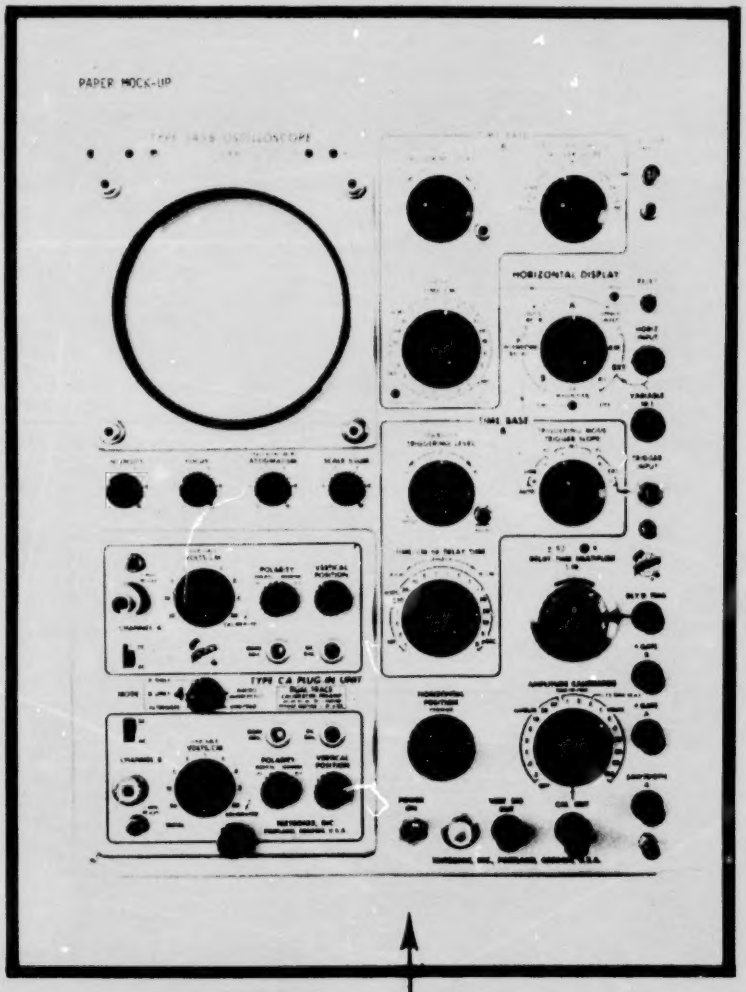
Present last step from previous cluster

If the procedure is to be performed on the job with a checklist, present the checklist items here.

Performing Procedures Format Model - Page 5

Use this type of page at the end of the learning module.

The purpose of this page format is to provide students with a way to practice one step, a set of steps, or all the steps in a procedure without the use of guides and prompts.



Make sure this page is a foldout that can be used at any time.

If the procedure is to be performed on the job with a checklist, present the entire checklist here, or on the opposite page where it can be easily seen while viewing this page.

EXAMPLE: SH-3H SONAR INITIAL CONTROL SETTING

Learning Objective: Using the mockup of the SENSO station, and the SDC checklist, DESCRIBE how to perform each item in the NATOPS SH-3H Sonar Initial Control Setting checklist, without hesitation, error or omission.

The example presents part of an instructional module developed by Helicopter Antisubmarine Squadron ONE (HS-1) and concerns the SENSO station in the SH-3H helicopter (Terrell, 1982). The module is designed to be a learning package for replacement crew training. The complete module contains 41 steps. The first 12 steps of the module demonstrate the use of all of the types of pages in the format model. These steps are presented in the following pages, along with a paper mockup of the SH-3H SENSO station which is in the module as a foldout. A larger paper mockup of the station, comparable in size to the actual panels, is an option that can be provided.

AQS-13E INITIAL CONTROL SETTINGS with SDC

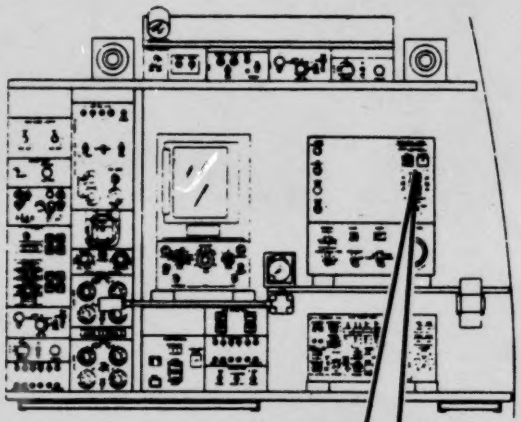
Panel/Group AZIMUTH AND RANGE INDICATOR

CHECKLIST

ITEM

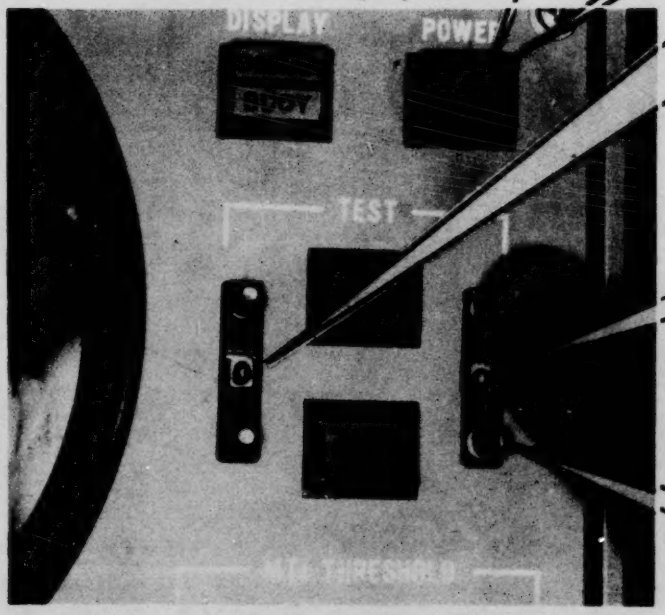
1. POWER switch (azimuth and range indicator)..... OFF (EXTINGUISHED)
2. TEST switch A (azimuth and range indicator)..... 0
3. TEST switch B (azimuth and range indicator)..... 0

Purpose: Prevent damage to Sonar due to voltage fluctuations during engine starts. Set normal operation BITE configuration.



1.1 ACTION:
If Sonar POWER switch light ON... THEN press SONAR POWER switch and release.

1.2 RESPONSE:
ON light goes out.



2.1 ACTION:
Set TEST switch A to 0.

3.1 ACTION:
Set TEST switch B to 0.

NOTE:
Upper switches advance counters, lower switches retard counters.

AQS-13E INITIAL CONTROL SETTINGS with SDC

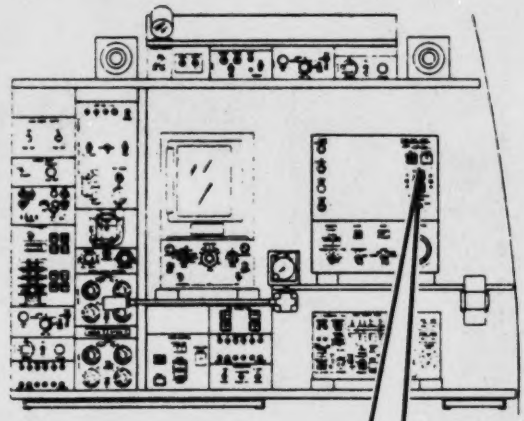
Panel/Group AZIMUTH AND RANGE INDICATOR

CHECKLIST

ITEM

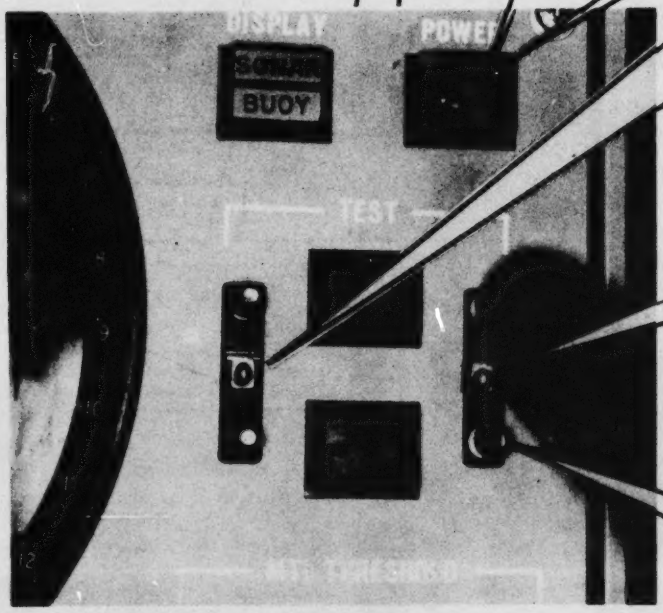
1. POWER switch (azimuth and range indicator)..... ___ (_____)
2. TEST switch A (azimuth and range indicator)..... _
3. TEST switch B (azimuth and range indicator)..... _

Purpose: Prevent damage to Sonar due to voltage fluctuations during engine starts. Set normal operation BIT configuration.



1.1 ACTION:
If Sonar POWER switch light __... THEN press SONAR POWER switch and release.

1.2 RESPONSE:
ON light goes ___.



2.1 ACTION:
Set TEST switch A to _.

3.1 ACTION:
Set TEST switch B to _.

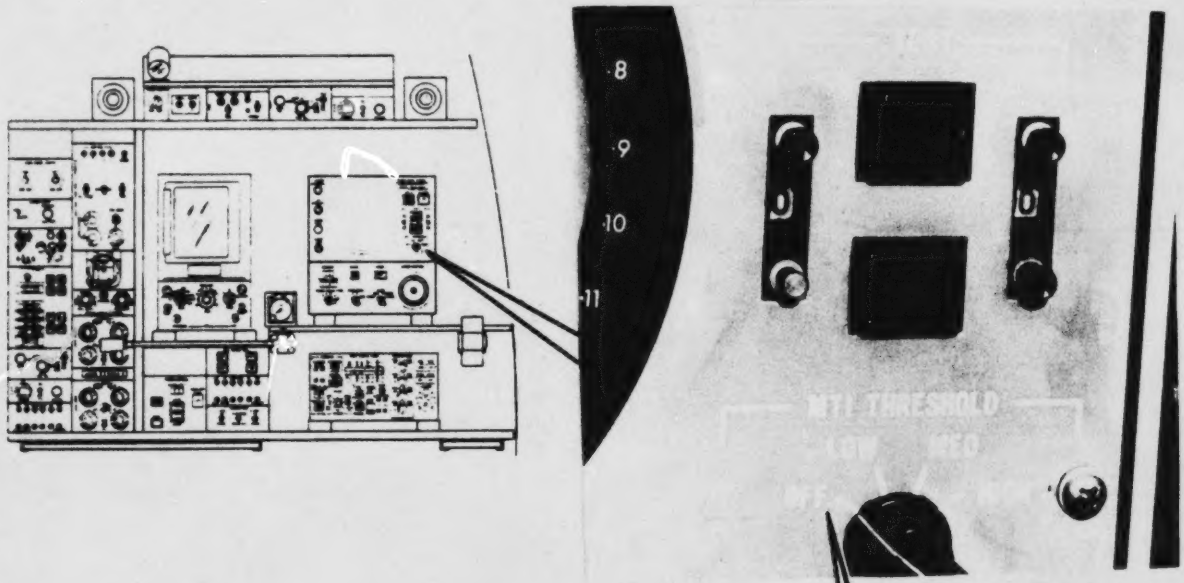
NOTE:
Upper switches _____ counters, lower switches _____ counters.

AQS-13E INITIAL CONTROL SETTINGS with SDC

Panel/Group AZIMUTH AND RANGE INDICATOR

CHECKLIST
ITEM
4. MTI THRESHOLD switch (azimuth and range indicator)..... OFF

Purpose: Disable Moving Target Indicator (MTI).



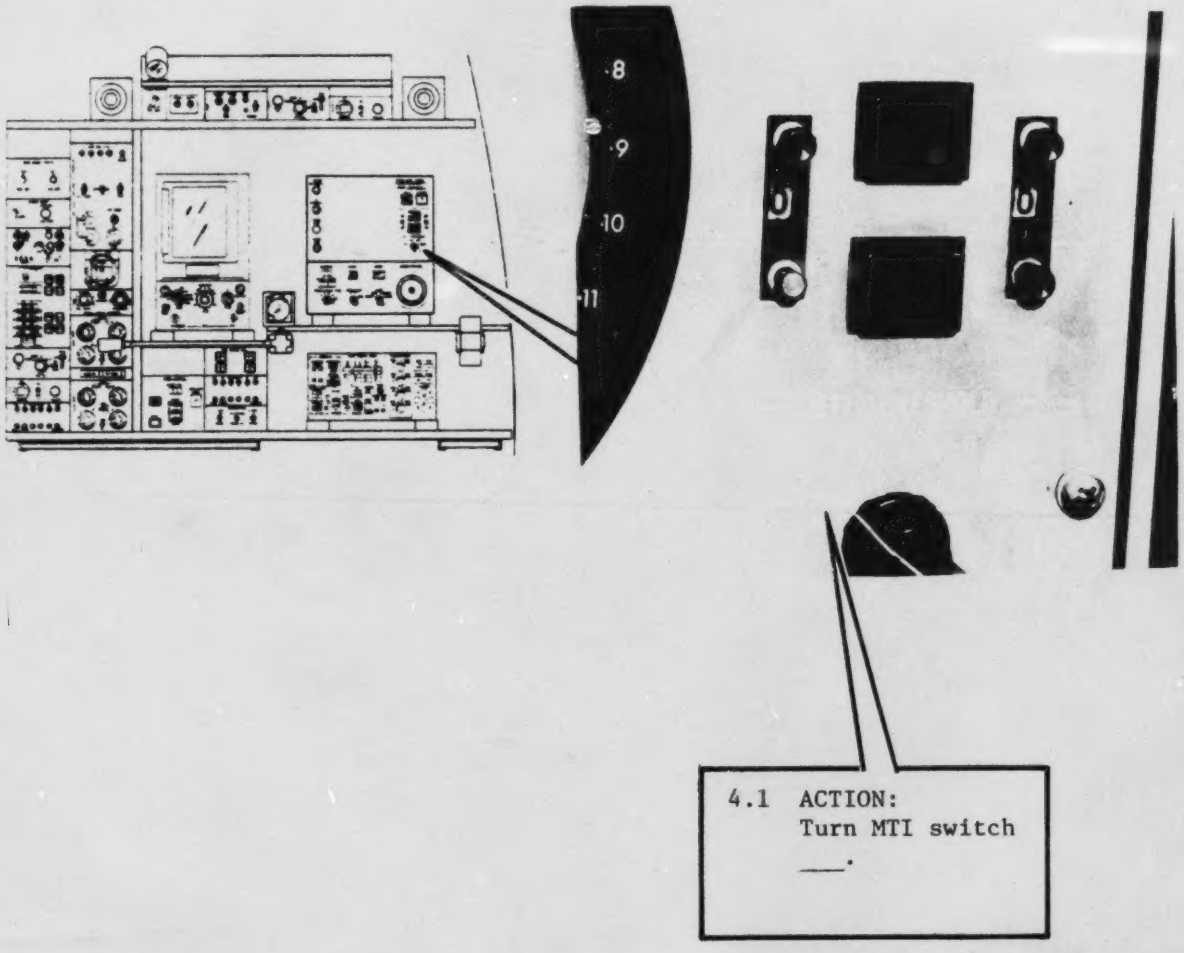
4.1 ACTION:
Turn MTI switch OFF.

AQS-13E INITIAL CONTROL SETTINGS with SDC

Panel/Group AZIMUTH AND RANGE INDICATOR

CHECKLIST
ITEM
4. MTI THRESHOLD switch (azimuth and range indicator)..... ___

Purpose: Disable Moving Target Indicator (MTI).

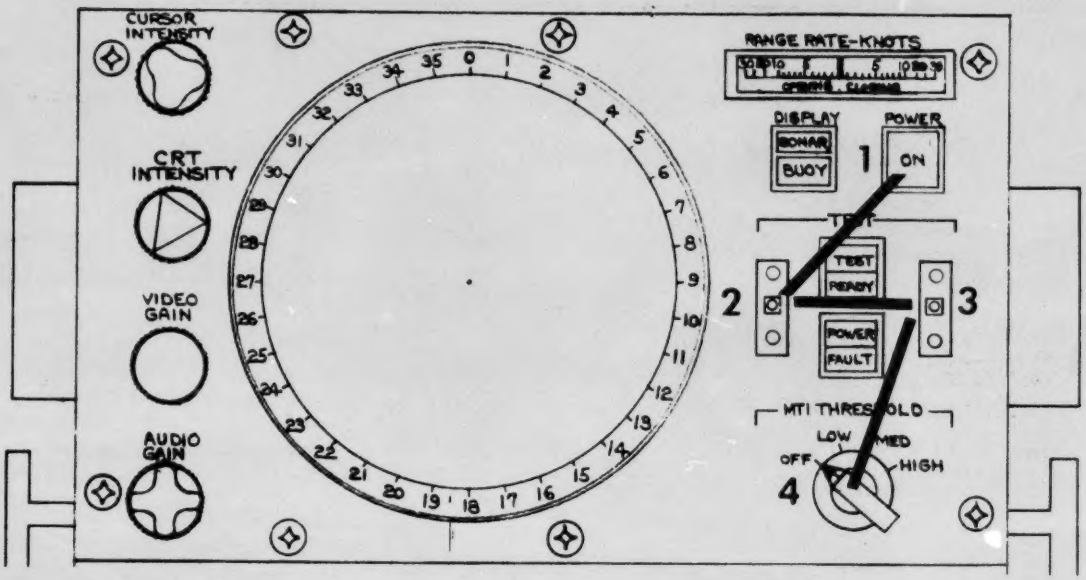


4.1 ACTION:
Turn MTI switch
___.

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation

Item 1: POWER.....
2: Test Switch A.....
3: Test Switch B.....
4: MTI THRESHOLD Switch.....



GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

AQS-13E Sonar Power Off Check

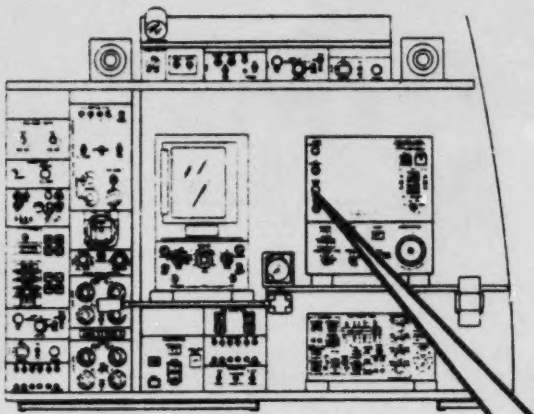
Panel/Group AZIMUTH AND RANGE INDICATOR

CHECKLIST

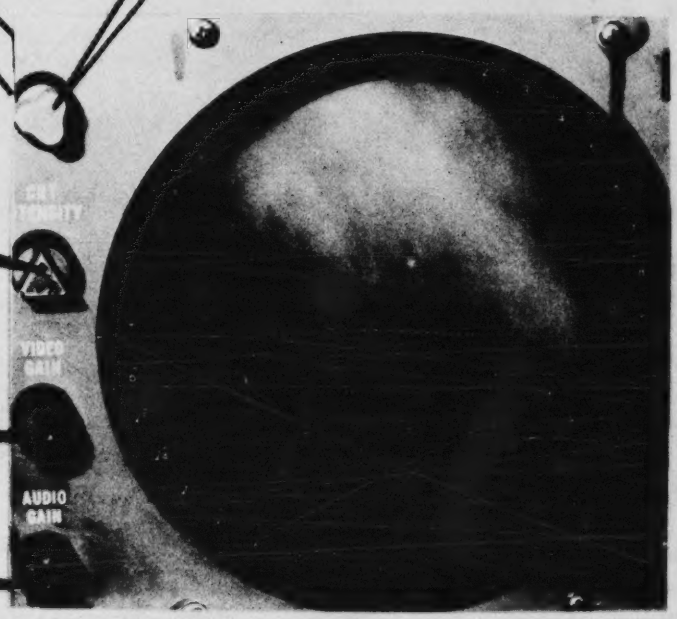
ITEM

5.	CURSOR INTENSITY control (azimuth and range indicator)...	FULL CCW
6.	CRT INTENSITY control (azimuth and range indicator).....	FULL CCW
7.	VIDEO GAIN control (azimuth and range indicator).....	FULL CCW
8.	AUDIO GAIN control (azimuth and range indictor).....	FULL CCW

Purpose: To set intensity and gain controls to minimum.



5.1 ACTION:
Turn CURSOR INTENSITY control fully counter clockwise.



6.1 ACTION:
Turn CRT INTENSITY control fully counter clockwise.

7.1 ACTION:
Turn VIDEO GAIN control fully counter clockwise.

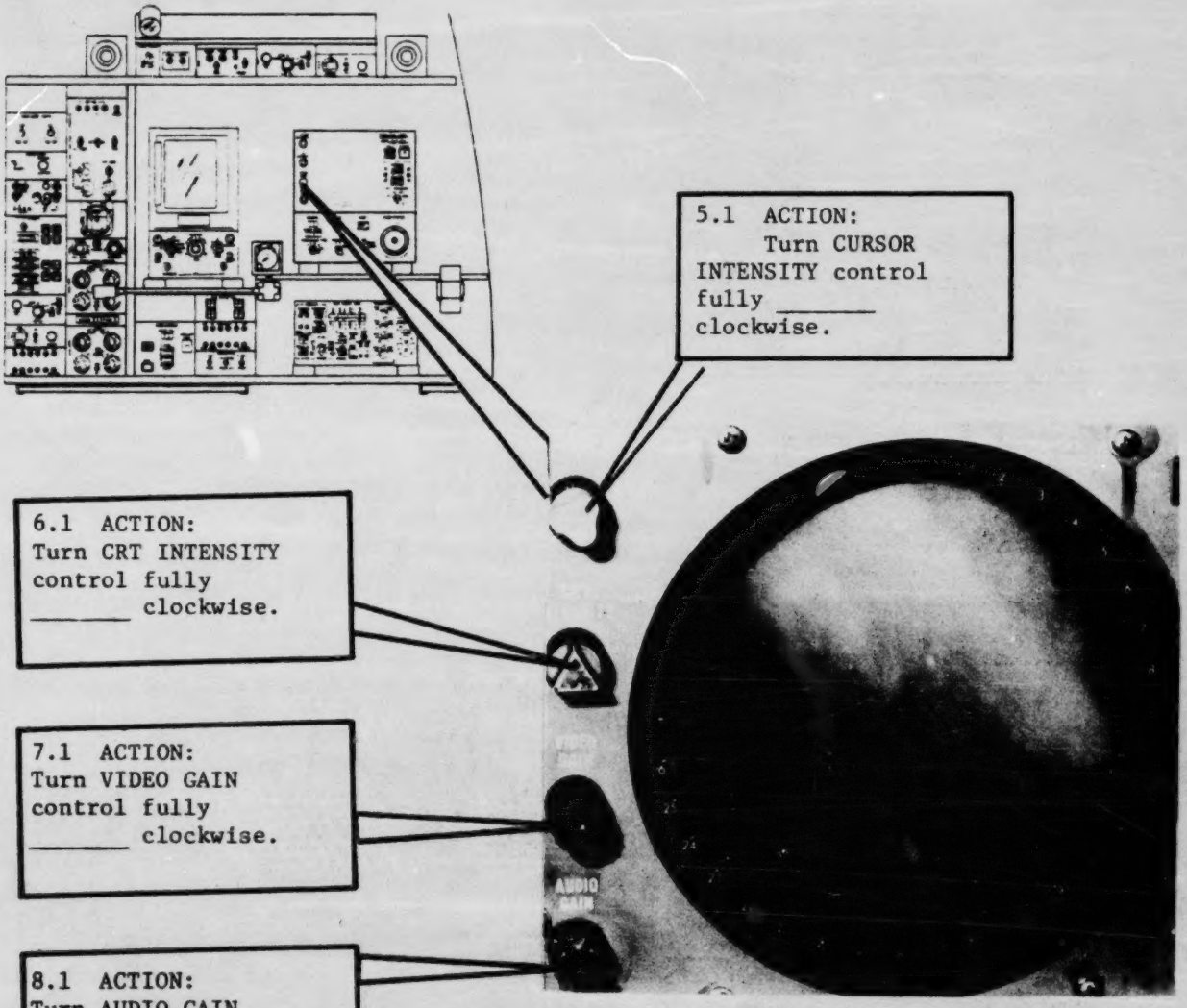
8.1 ACTION:
Turn AUDIO GAIN control fully counter clockwise.

AQS-13E Sonar Power Off Check

Panel/Group AZIMUTH AND RANGE INDICATOR
CHECKLIST
ITEM

5.	CURSOR INTENSITY control (azimuth and range indicator)...	FULL ___
6.	CRT INTENSITY control (azimuth and range indicator).....	FULL ___
7.	VIDEO GAIN control (azimuth and range indicator).....	FULL ___
8.	AUDIO GAIN control (azimuth and range indictor).....	FULL ___

Purpose: To set intensity and gain controls to minimum.

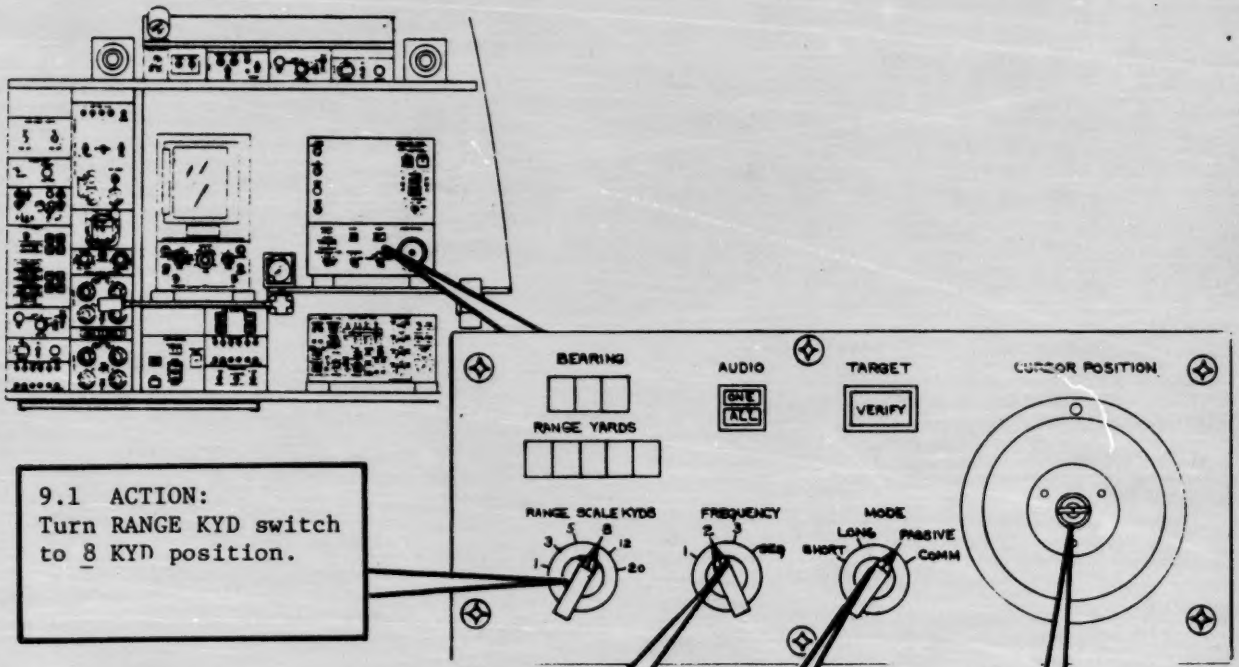

5.1 ACTION:
Turn CURSOR INTENSITY control fully _____ clockwise.
6.1 ACTION:
Turn CRT INTENSITY control fully _____ clockwise.
7.1 ACTION:
Turn VIDEO GAIN control fully _____ clockwise.
8.1 ACTION:
Turn AUDIO GAIN control fully _____ clockwise.
AUDIO

AQS-13E Sonar Power Off Check

Panel/Group SONAR RECEIVER
CHECKLIST
ITEM

9.	RANGE SCALE-KYDS switch (sonar receiver).....	8
10.	FREQUENCY switch (sonar receiver).....	2
11.	MODE switch (sonar receiver).....	PASSIVE
12.	CURSOR POSITION control (sonar receiver).....	AS SET

Purpose: Ensure proper mode, frequency, and range scale for starting power on preflight checks.



9.1 ACTION:
Turn RANGE KYD switch to 8 KYD position.

10.1 ACTION:
Turn FREQUENCY switch to 2.

12.1 CURSOR POSITION as set.

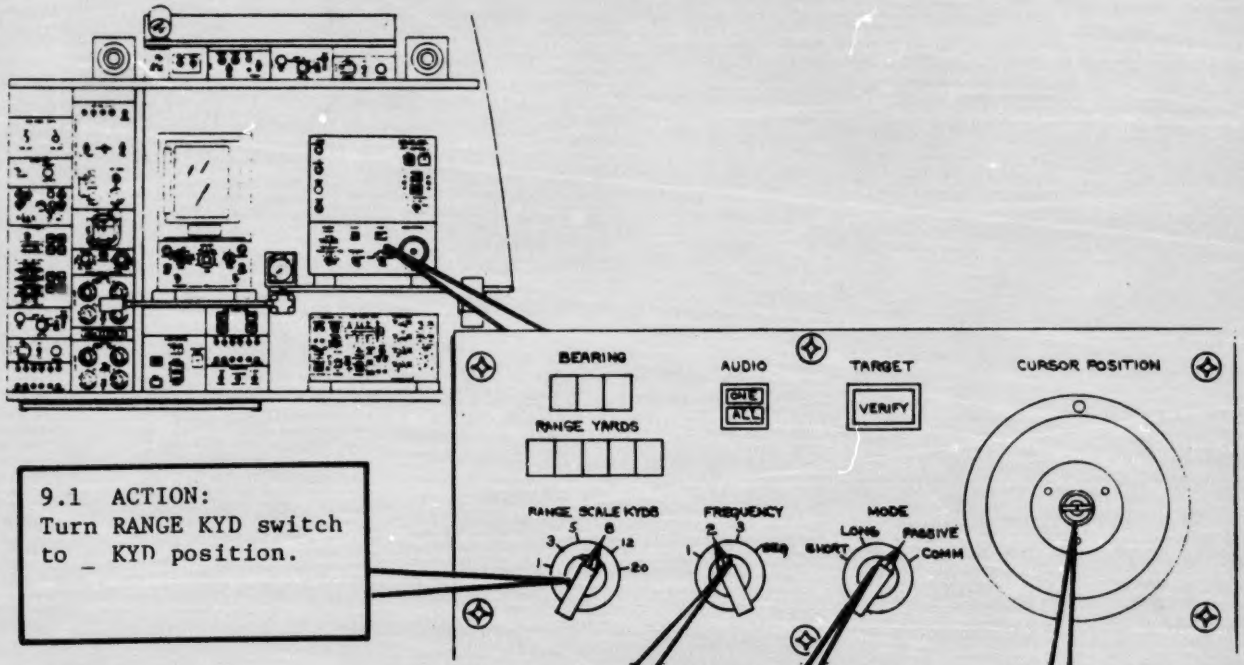
11.1 ACTION:
Turn mode switch to PASSIVE.

AQS-13E Sonar Power Off Check

Panel/Group SONAR RECEIVER
CHECKLIST
ITEM

9. RANGE SCALE-KYDS switch (sonar receiver)..... _
10. FREQUENCY switch (sonar receiver)..... _
11. MODE switch (sonar receiver)..... _____
12. CURSOR POSITION control (sonar receiver)..... __ __

Purpose: Ensure proper mode, frequency, and range scale for starting power on preflight checks.



9.1 ACTION:
Turn RANGE KYD switch to _ KYD position.

10.1 ACTION:
Turn FREQUENCY switch to _.

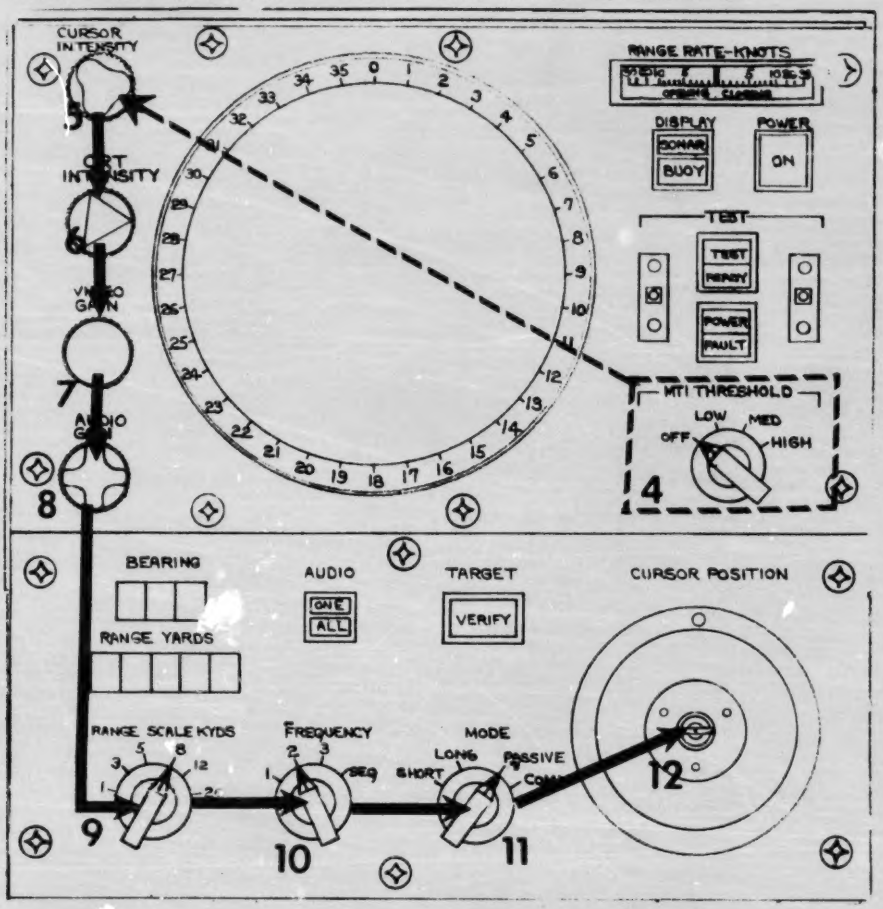
12.1 CURSOR POSITION
__ __.

11.1 ACTION:
Turn mode switch to _____.

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation

Item 5: CURSOR INTENSITY control.....
6: CRT INTENSITY control.....
7: VIDEO GAIN.....
8: AUDIO GAIN.....
9: RANGE SCALE KYDS switch.....
10: FREQUENCY switch.....
11: MODE switch.....
12: CURSOR POSITION control.....

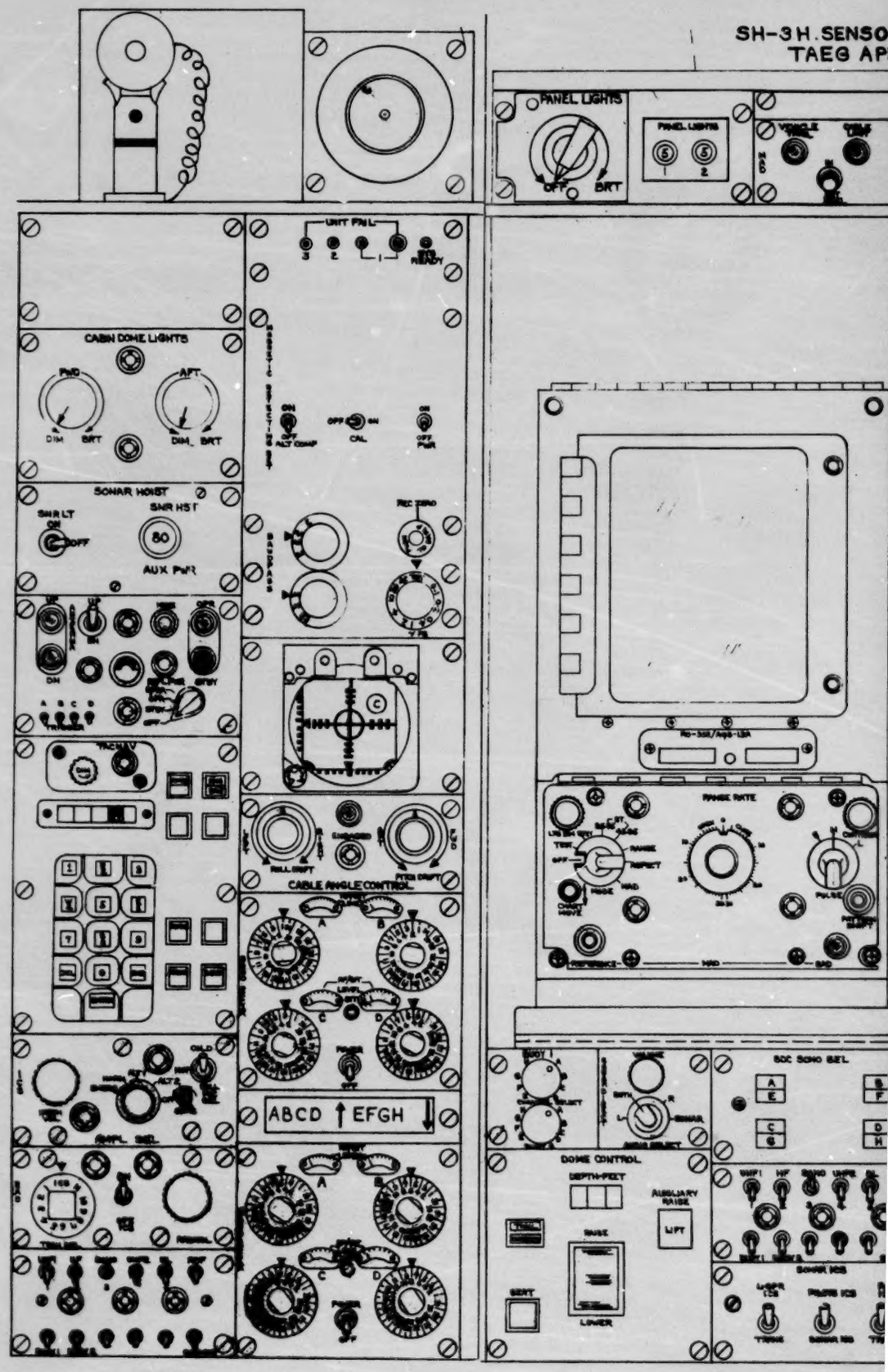


GO TO PAPER PICK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

Initial Control Setting with SDC.

1. POWER switch(azimuth and range indicator).....OFF(EXTINGUISHED)
2. TEST switch A (azimuth and range indicator).....0
3. TEST switch B (azimuth and range indicator).....0
4. MTI THRESHOLD switch (azimuth and range indicator).....OFF
5. CURSOR INTENSITY control (azimuth and range indicator).....FULL CCW
6. CRT INTENSITY control (azimuth and range indicator).....FULL CCW
7. VIDEO GAIN control (azimuth and range indicator).....FULL CCW
8. AUDIO GAIN control (azimuth and range indicator).....FULL CCW
9. RANGE SCALE-KYDS switch (sonar receiver).....8
10. FREQUENCY switch (sonar receiver).....2
11. MODE switch (sonar receiver).....PASSIVE
12. CURSOR POSITION control (sonar receiver).....AS SET
13. MODE switch (recorder).....OFF
14. RANGE RATE control (recorder).....0
15. PULSE switch (recorder).....M
16. CONTRAST control (recorder).....MIDPOSITION
17. POWER circuit breaker (sonar transmitter).....UP(ON)
18. SDC PROCESS MODE selector switches channels A thru D.....OFF
19. SDC DOWNLINK CHANNEL SELECT switches.....00
20. SDC SENSOR switch.....Q13(PPI)
21. TRANS SEL switch (transmitter selector panel).....ICS
22. ICS ON/OFF switch (transmitter selector panel).....ON
23. RAD VOL control (transmitter selector panel).....3/4 TO FULL CW
24. INTPH VOL control (ICS master control panel).....MIDPOSITION
25. AMPL SEL switch (ICS master control panel).....NORM
26. MIC SEL switch (ICS master control panel).....COLD
27. Receiver selector panel switches.....OFF
28. SONO switch (receiver selector panel).....ON
29. L-OPR switch (SONAR ICS transmit selector panel).....ICS
30. R-OPR switch (SONAR ICS transmit selector panel).....ICS
31. PILOTS/SONAR ICS switch (SONAR ICS transmit selector panel).....PILOTS ICS
32. UHF 2 switch (cockpit console).....COMM
33. PANEL LIGHTS knob (sensor operators console).....AS DESIRED
34. POWER switch (ABCD sonobuoy receiver panel).....POWER
35. A,B,C,D channel switches (sonobuoy receiver panel).....1,2,3,4 RESPECTIVELY
36. POWER switch (EFGH sonobuoy receiver panel).....POWER
37. E,F,G,H channel switches (sonobuoy receiver panel) 5,6,7,8 RESPECTIVELY
38. A/E, B/F, C/G, D/H pushbuttons (SDC SONB SEL panel).....A,B,C,D ILLUMINATED
39. Hover indicator.....C MODE
40. ROLL DRIFT control (cable angle control panel).....MIDPOSITION
41. PITCH DRIFT control (cable angle control panel).....MIDPOSITION



R STATION
RIL 81

DRAWN BY:- C.V. JOHNSON

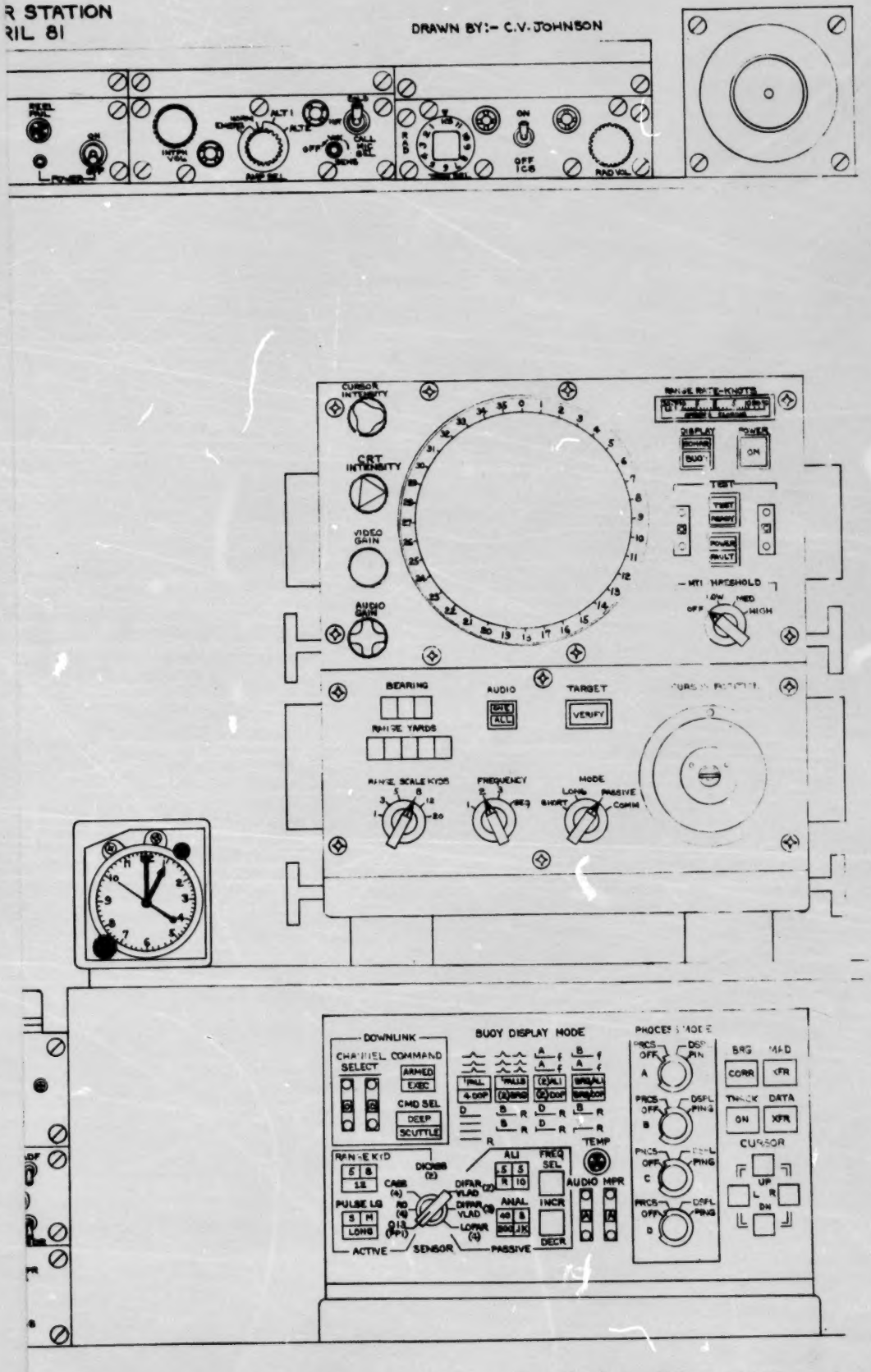


Figure 6. Mock-up Page 35/36

SECTION IV

RECALLING FACTS ABOUT EQUIPMENT

DESCRIPTION OF TASK CATEGORY

This task category involves naming the equipment components, describing the functions served by them, and locating the components on the equipment. The naming, describing, and locating behaviors are basic enabling skills which make it easier for students to learn to operate or maintain the system and to discuss the system with others.

Four examples of learning objectives are provided below to illustrate the types of tasks that are included in this task category.

1. Given the list of names of components and a list of the functions of these components, MATCH the name of components of the Casualty Power System with statements describing the functions of each.

2. Given an illustration of the Econ II Hot Water Heater, TRACE, by drawing arrows, the flow of seawater from the intake, through the heater, to the diving suit and write the name and function of each component.

3. Given an exploded illustration of an Mk 12 Diving Helmet, LABEL the Exhaust Valve, Air Control Valve, Air Diffuser, and Communications Jack.

4. Given an illustration of the emergency switchboard subsystems, DESCRIBE, in writing, the name and function of each subsystem used in the automatic operation of the emergency switchboard upon loss and restoration of preferred ship's service power.

LEARNING STRATEGY

The learning strategy for this type of task contains four special operations. First, the equipment is described in terms of subsystems, components, and parts. This organization which relates one piece of equipment to another according to location or function, serves as a structure for grouping elements into meaningful relationships. It provides a basis for storing and retrieving facts about the equipment.

Graphics are used to establish the location and appearance of the equipment and its functions. However, written words, either in conjunction with graphics or separately, remain essential to the naming of elements in equipment and to describing some of their functions.

Mnemonics will aid students in remembering difficult to recall facts, especially numbers, names, and acronyms. Mnemonics take the form of easily remembered rhymes, patterns, and stories, that contain hard to recall information. By remembering the mnemonic, and then identifying the special information imbedded in it, one can reconstruct the needed information or confirm that the information has been recalled accurately.

Exercises for distributing practice in recalling facts about equipment will be required if the opportunity to recall these facts is not provided in subsequent lessons or laboratory exercises.

FORMAT MODEL

The format model for recalling facts about equipment is presented next. In this model the essential elements involved in naming the various components of an oscilloscope and the functions performed are organized for learning. There are five separately numbered pages in this format model. Page 1 of the model illustrates how to present a simple description of an equipment and its major components. Page 2 presents the names, locations, and functions of the components, and page 3 provides an exercise in recalling page 2 type information. Page 4 presents an exercise over a larger section of the equipment, and page 5 presents the answers to this exercise.

Following the format model presentation, another example of instructional material conforming to the model specifications is provided employing the task of recalling the names of a vessel's navigation lights and listing the characteristics of these lights.

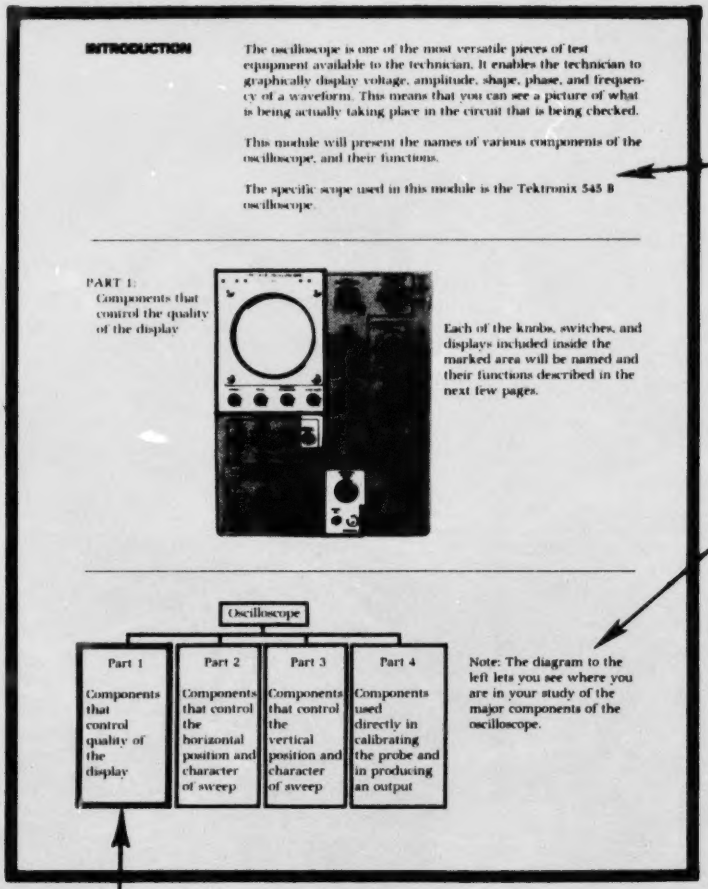
FORMAT MODEL
RECALLING FACTS ABOUT EQUIPMENT

A general format for use in designing training materials to teach names, locations, and functions of the various components of a system.

Recalling Facts About Equipment Format Model - Page 1

Use this page format to an overview of the entire system or that part of the system to be described next.

The purpose of this page format is to:
- present high level system descriptions.
- name the major parts.
- point out the next part to be described in greater detail.


INTRODUCTION
The oscilloscope is one of the most versatile pieces of test equipment available to the technician. It enables the technician to graphically display voltage, amplitude, shape, phase, and frequency of a waveform. This means that you can see a picture of what is being actually taking place in the circuit that is being checked.
This module will present the names of various components of the oscilloscope, and their functions.
The specific scope used in this module is the Tektronix 545 B oscilloscope.
PART 1:
Components that control the quality of the display
Each of the knobs, switches, and displays included inside the marked area will be named and their functions described in the next few pages.
Oscilloscope
Part 1
Components that control quality of the display
Part 2
Components that control the horizontal position and character of sweep
Part 3
Components that control the vertical position and character of sweep
Part 4
Components used directly in calibrating the probe and in producing an output
Note: The diagram to the left lets you see where you are in your study of the major components of the oscilloscope.

Put introduction on first page only

Repeat this type page for each subsystem

Describe each subsystem

Make a bold line around subsystem to be presented next

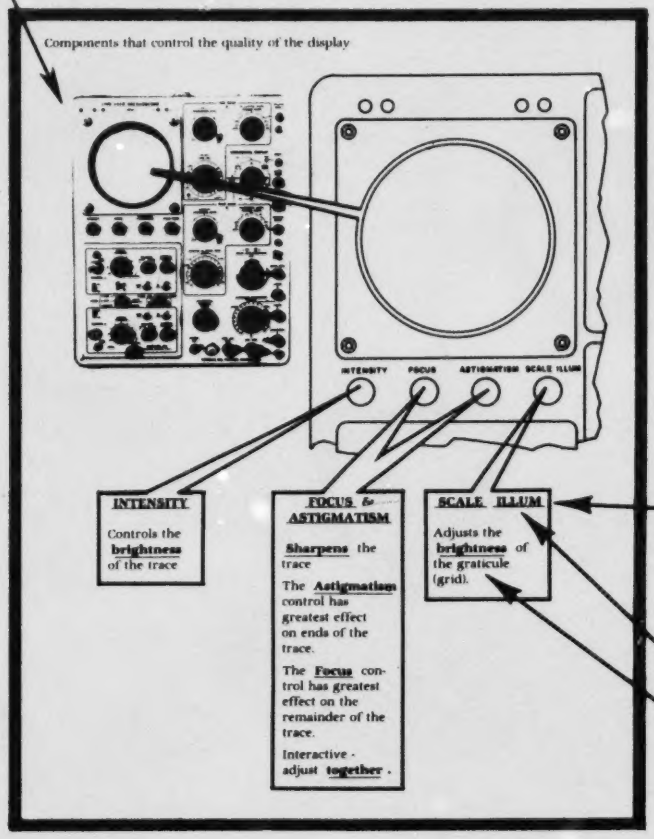
Recalling Facts About Equipment Format Model - Page 2

Use this page format to present information on the components of that portion of the system under discussion.

The purpose of this page format is to present the components':
- Names.
- Locations.
- Functions.

Overview should generally be in upper left hand corner of page

Point dart from close-up to general location on the overview


Components that control the quality of the display
INTENSITY
Controls the brightness of the trace
FOCUS & ASTIGMATISM
Sharpens the trace
The Astigmatism control has greatest effect on ends of the trace.
The Focus control has greatest effect on the remainder of the trace.
Interactive - adjust together.
SCALE ILLUM
Adjusts the brightness of the graticule (grid).

Place boxes so they appear in order—left to right, right to left, or top to bottom

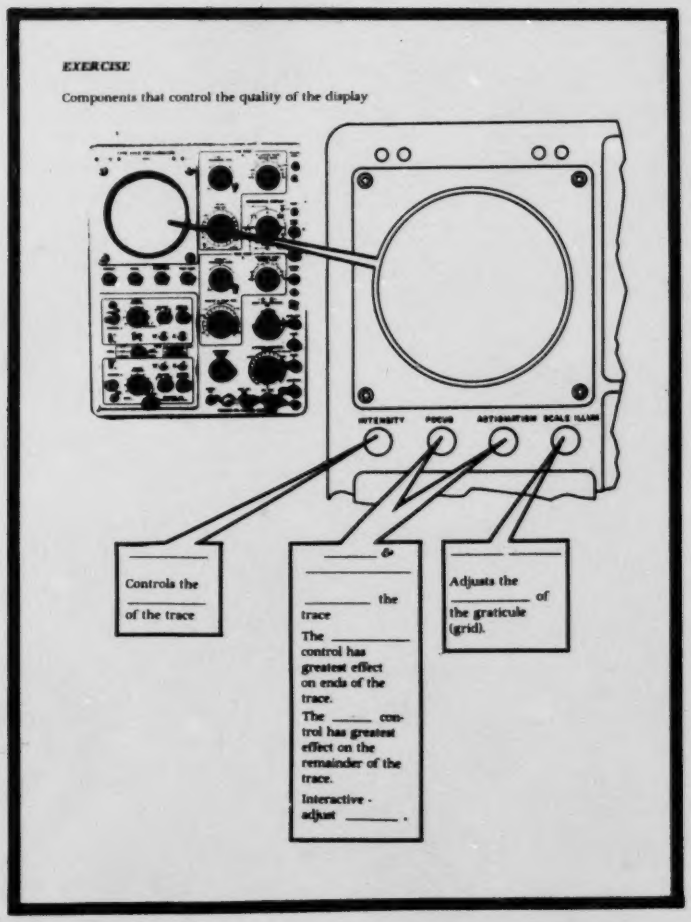
Present:
- Name of component
- Function

Recalling Facts About Equipment Format Model - Page 3

Use this page format immediately following each use of page 2 format.

The purpose of this page format is to:
- focus student attention on key words.
- provide students exercise in the recall of name, location, and function of each component when some cues are present.

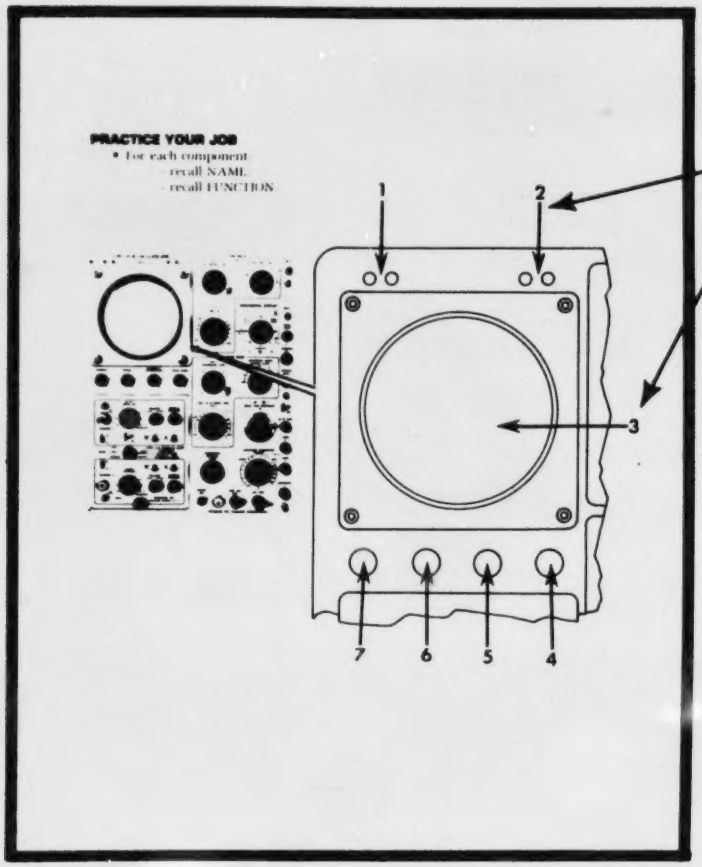
Copy the previous page. Then drop out key words that were underlined on the previous page.



Recalling Facts About Equipment Format Model - Page 4

Use this page format immediately after presenting all the components of that part of the system under discussion or after presenting 7 components, which ever comes first.

The purpose of this page format is to provide students exercise in recalling information about the components with no verbal cues present.



Number components in a clockwise manner

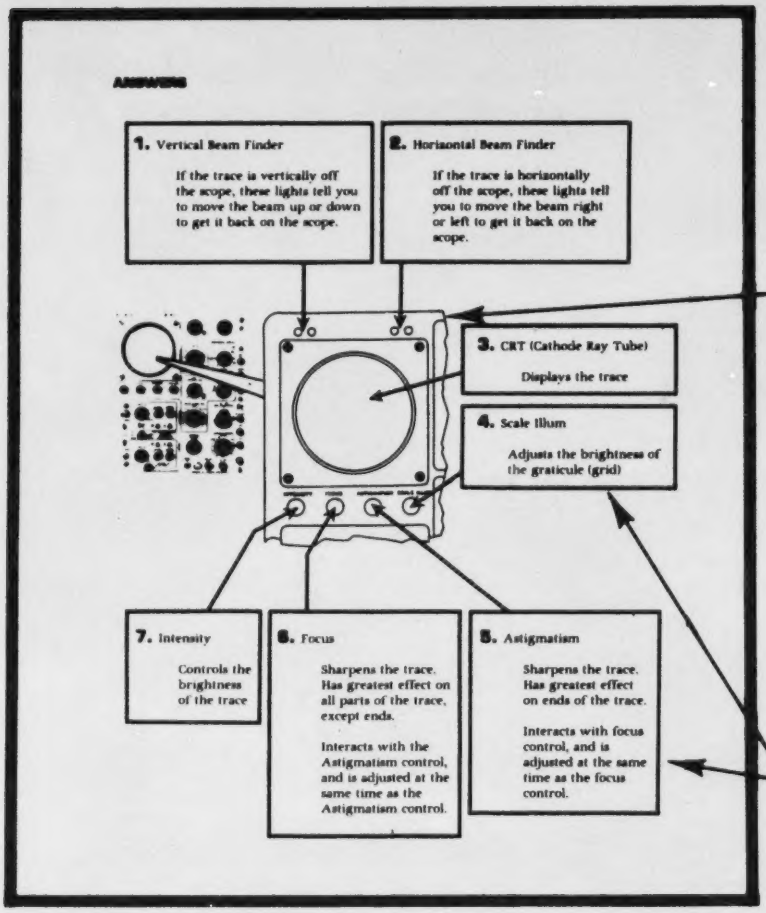
Use close-ups so that the components can be easily seen

Use line drawings or photographs

Recalling Facts About Equipment Format Model - Page 5

Use this format immediately after each use of the page 4 format.

The purpose of this page format is to present the answers to the questions on the previous page.


ANSWERS
1. Vertical Beam Finder
If the trace is vertically off the scope, these lights tell you to move the beam up or down to get it back on the scope.
2. Horizontal Beam Finder
If the trace is horizontally off the scope, these lights tell you to move the beam right or left to get it back on the scope.
3. CRT (Cathode Ray Tube)
Displays the trace
4. Scale Illum
Adjusts the brightness of the graticule (grid)
7. Intensity
Controls the brightness of the trace
8. Focus
Sharpens the trace. Has greatest effect on all parts of the trace, except ends.
Interacts with the Astigmatism control, and is adjusted at the same time as the Astigmatism control.
9. Astigmatism
Sharpens the trace. Has greatest effect on ends of the trace.
Interacts with focus control, and is adjusted at the same time as the focus control.

Reduce EXERCISE page and place against left margin

Place answers in same general area as Numbers on EXERCISE page

EXAMPLE: THE SYSTEM OF LIGHTS ON A VESSEL

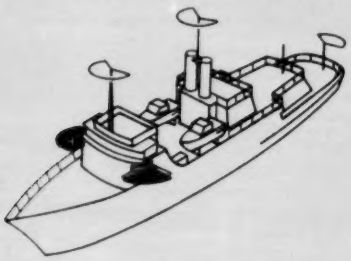
Learning Objective: NAME the lights governed by The Rules of the Road and DESCRIBE the characteristics of individual lights.

This example presents a section of an instructional module which explains the system of navigation lights on sea-going vessels. The complete module presents the lights as a system composed of two major parts: running lights and special lights. For the purpose of demonstrating the formatting process, only the pages concerning running lights are presented here.

TYPES OF LIGHTS

The Quartermaster must know and be able to interpret **The Rules of the Road** in order to light his own vessel and to identify the characteristics and activity of other vessels to prevent collision at sea. To understand the Rules, you need to know about the systems of lights on vessels. This booklet will help you learn them, but you will also need to read *U. S. Coast Guard Navigation Rules: International and Inland* (referred to as CG-169).

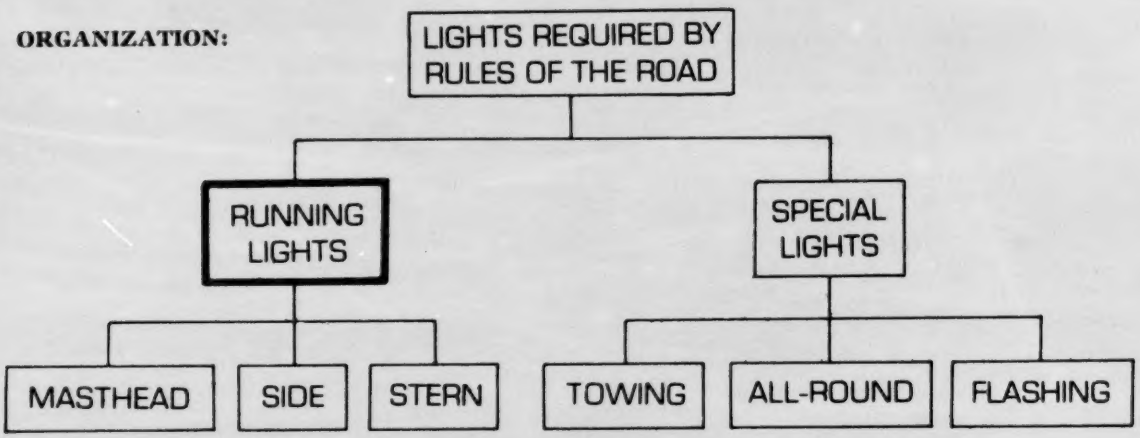
After completing this booklet you should be able to name the lights governed by **The Rules of the Road** and describe the characteristics of individual lights.



Running Lights—vessel 50 meters or more in length

The vessel shown here has typical running lights. There are special lights which will be described later in this booklet that are often combined with running lights.

ORGANIZATION:



—First, you will be given an introduction to each set of lights.

—Next, you will be given an exercise to test your ability to recall the characteristics of each light.

—Then, after each major section (Running and Special Lights) you will use a self-quiz to determine whether you are ready to go on or if you require more practice.

—Finally, you will take a self-test over all these lights.

TESTING: Your instructor will test you with material similar to the exercises.

** Double asterisks indicate words found in the glossary at the back of the booklet.

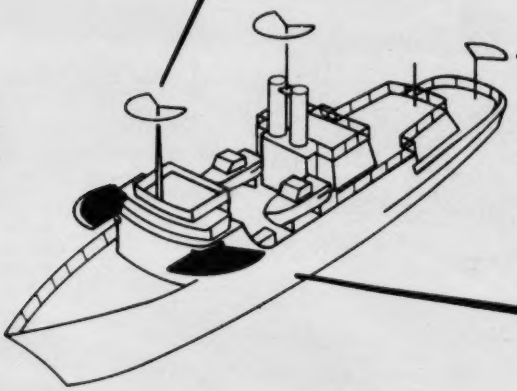
RUNNING LIGHTS are lights required on a vessel to indicate to other vessels its presence, and direction of travel, in order to prevent **collisions** during the hours of darkness or if there is reduced visibility. They are often used in **combination** with **special** lights to indicate a vessels **activity** .

1. **Masthead** Lights

Rule 21(a), p. 24 *

NOTE: The **second** (after) masthead light is optional for vessels less than **50** meters in length.

Rule 23(a)(ii), p. 28 *



2. **Sternlight**

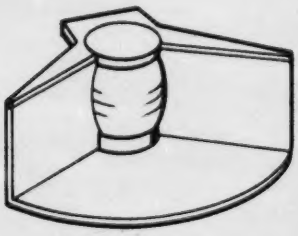
Rule 21(c), p. 24 *

3. **Sidelights** (**Port** and **Starboard**)

Rule 21(b), p. 24 *

4. You can't see all these lights from every **position** . All Running Lights have **screens** painted matte black to block light from certain angles.

Both Running and Special Lights have **bottom** screens to prevent light from reflecting on the vessel.



* This information is provided so you can read the appropriate rule in CG-169.

EXERCISE

DO NOT WRITE IN THIS BOOKLET

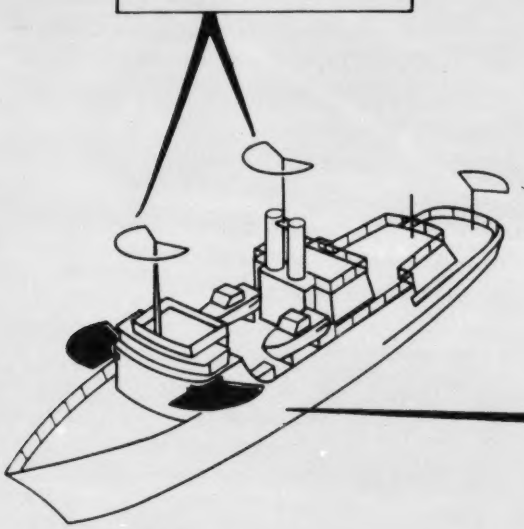
RUNNING LIGHTS are lights required on a vessel to indicate to other vessels its presence, direction of travel, and type of operations in order to prevent _____ during the hours of darkness or reduced visibility.

1. _____ Lights

Rule 21(a), p. 24

NOTE: The _____ (after) masthead light is optional for vessels less than __ meters in length.

Rule 23(a)(ii), p. 28



2. _____

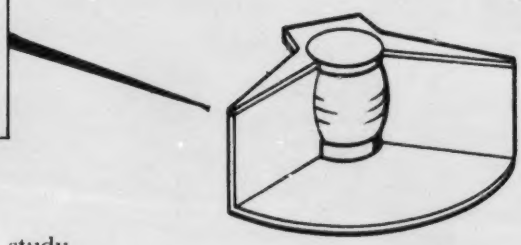
Rule 21(c), p. 24

3. _____ (___ and _____)

Rule 21(b), p. 24

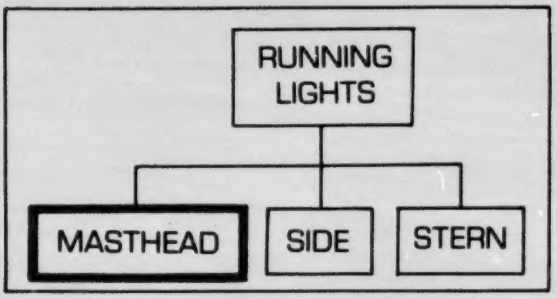
4. You can't see all these lights from every _____. All Running Lights have _____ painted matte black to block light from certain angles.

Both Running and Special Lights have _____ screens to prevent light from reflecting on the vessel.



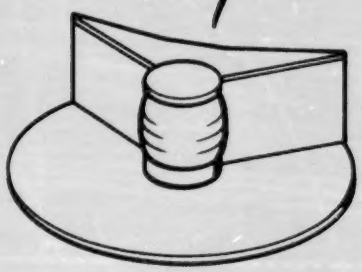
—If you missed any answers, go back and study page 46. Then repeat the exercise.

—**Next you will learn the characteristics of each of the Running Lights.**



1. **Color:**
White

Rule 21(a), p. 24.

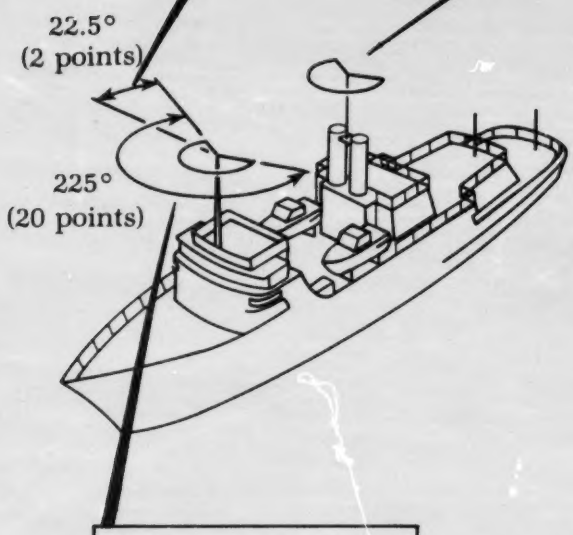


4. **Aim:**
Can be seen from **dead ahead** ** to **22.5°** abaft** the beam** on either side of the vessel.

Rule 21(a), p. 24.

2. **Location:**
Placed over the fore and aft **center line** of the vessel.

Rule 21(a), p. 24, CG-169.



NOTE: A second masthead light **abaft** of and **higher** than the forward one. A vessel of less than **50** meters shall not be obliged to exhibit such a light but may do so.

Rule 23(a)(ii), p. 28, CG-169.

3. **Arc:**
Showing an unbroken light over an arc of the horizon of **225°** (20 points).

Rule 21(a), p. 24.

NOTE: Sometimes the arc of a light is described in points.

One point equals **11-1/4** degrees which is 1/32 of a circle.

Masthead light 225° 20 pts

Sidelight 112.5° 10 pts

Sternlight 135° 12 pts

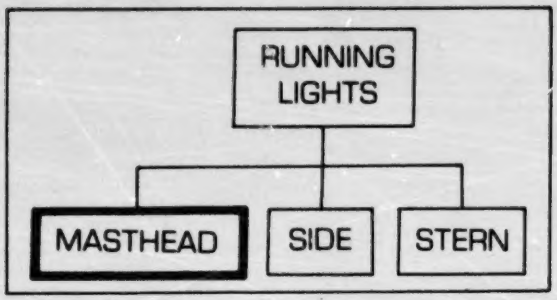
All round light 360° 32 pts

Read the following rules before going on:

Rule 21(a), p. 24, CG-169
Rule 23(a)(ii), p. 28, CG-169.

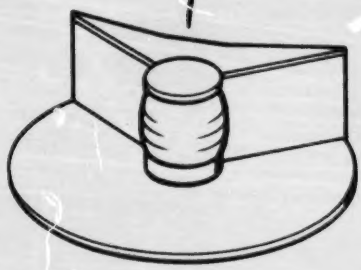
** Double asterisks indicate words found in the glossary at the back of the booklet.

EXERCISE **DO NOT WRITE IN THIS BOOKLET**



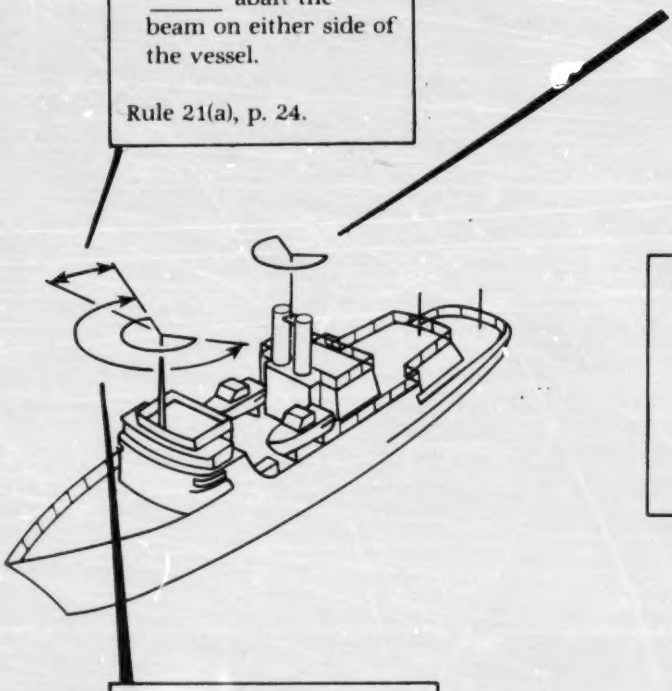
1. Color:
_____

Rule 21(a), p. 24.



4. Aim:
Can be seen from _____ _____ to _____ abaft the beam on either side of the vessel.

Rule 21(a), p. 24.



2. Location:
Placed over the fore and aft _____ ___ of the vessel.

Rule 21(a), p. 24, CG-169.

NOTE: A second masthead light _____ of and _____ than the forward one. A vessel of less than __ meters shall not be obliged to exhibit such a light but may do so.

Rule 23(a)(ii), p. 28, CG-169.

3. Arc:
Showing an unbroken light over an arc of the horizon of ____ (20 points).

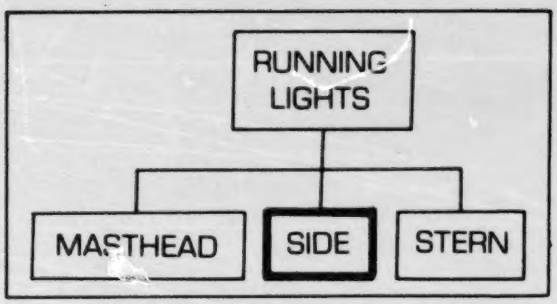
Rule 21(a), p. 24.

NOTE: Sometimes the arc of a light is described in points.

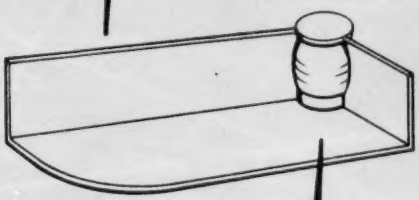
One point equals _____ degrees which is 1/32 of a circle.

Masthead light	225°	20 pts
Sidelight	112.5°	10 pts
Sternlight	135°	12 pts
All round light	360°	32 pts

If you missed any answers, go back and study Page 48. Then repeat the exercise.



1. Screen
Purpose—to permit lights to be seen only at certain angles.

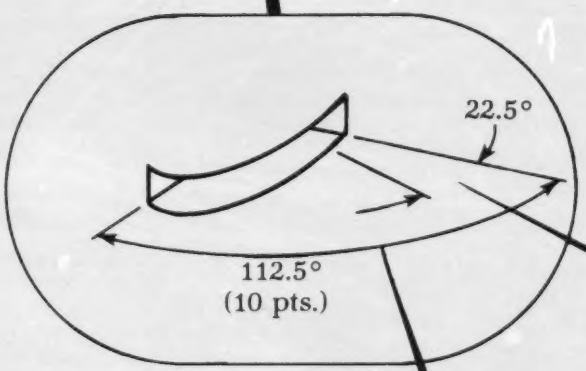


2. **Color:**
Green on starboard
Red on port

Rule 21(b), p. 24, CG-169.

3. **Location:**
On the **starboard** and **port** sides.

Rule 21(b), p. 24.



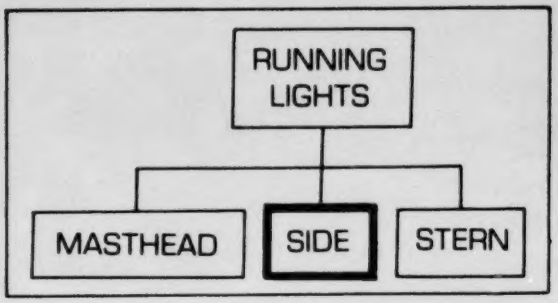
5. **Aim:**
Can be seen from **dead ahead** to **22.5°** abaft the beam.
Rule 21(b), p. 24.

4. **Arc:**
Showing an unbroken light over an arc of **112.5°** (10 points).
Rule 21(b), p. 24.

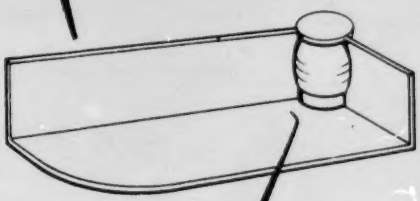
Read Rule 21(b), p. 24, CG-169 before going on.

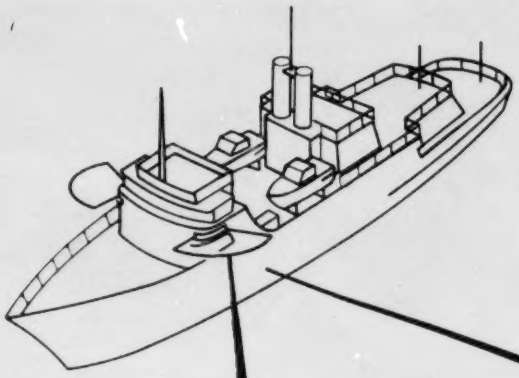
19

EXERCISE DO NOT WRITE IN THIS BOOKLET



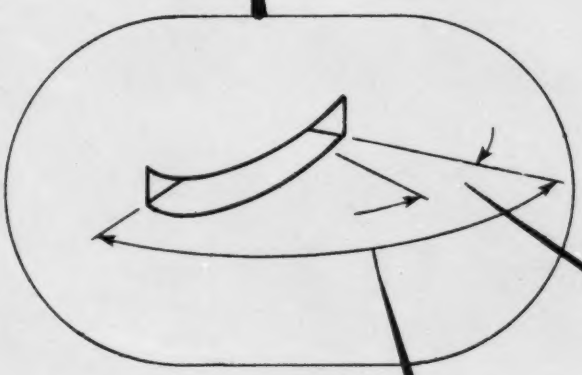
1. Screen
Purpose—to permit lights to be seen only at certain angles.





2. **Color:**
_____ on starboard
____ on port
Rule 21(b), p. 24, CG-169.

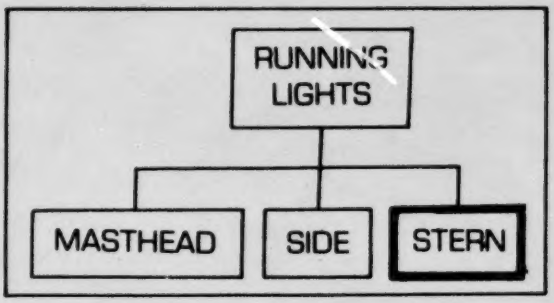
3. **Location:**
On the _____ and _____ sides.
Rule 21(b), p. 24.



5. **Aim:**
Can be seen from _____ _____ to _____ abaft the beam.
Rule 21(b), p. 24.

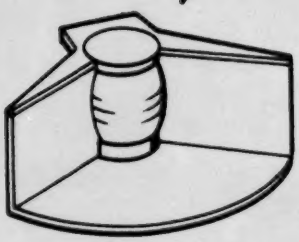
4. **Arc:**
Showing an unbroken light over an arc of _____ (10 points).
Rule 21(b), p. 24.

If you missed any answers, go back and study page 50. Then repeat the exercise.



1. **Color:**
White

Rule 21(c), p. 26.



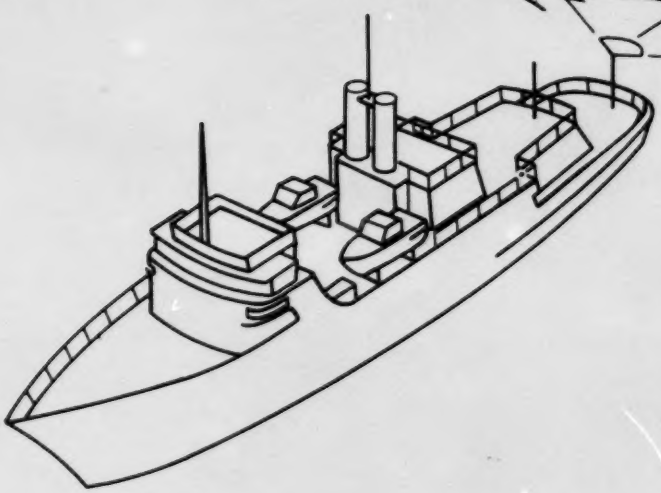
2. **Location:**
Placed on the **stern** as nearly as possible.

Rule 21(c), p. 26.

3. **Arc:**
Showing an unbroken light over an arc of **135°** (12 points).
Rule 21(c), p. 26.

135°
(12 pts.)

67.5°

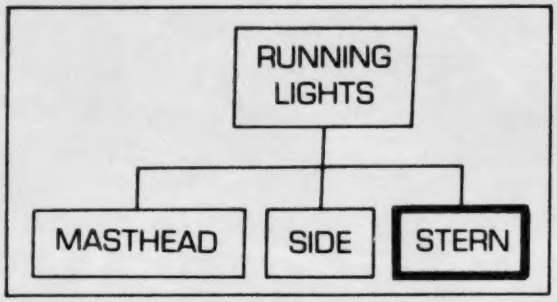


4. **Aim:**
Can be seen from dead **astern** ** to **67.5°** either side of vessel.

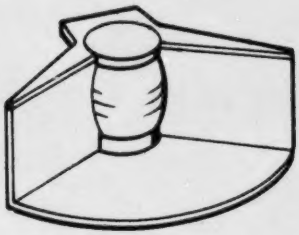
Rule 21(c), p. 26.

Read Rule 21(c), p. 26, CG-169 before going on.

EXERCISE **DO NOT WRITE IN THIS BOOKLET**

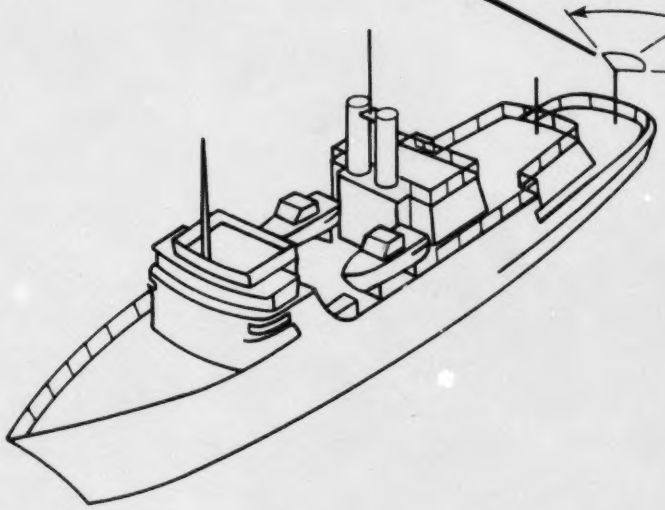


1. **Color:**
   _____
   Rule 21(c), p. 26.



2. **Location:**
   Placed on the _____ as nearly as possible.
   Rule 21(c), p. 26.

3. **Arc:**
   Showing an unbroken light over an arc of _____ (12 points).
   Rule 21(c), p. 26.



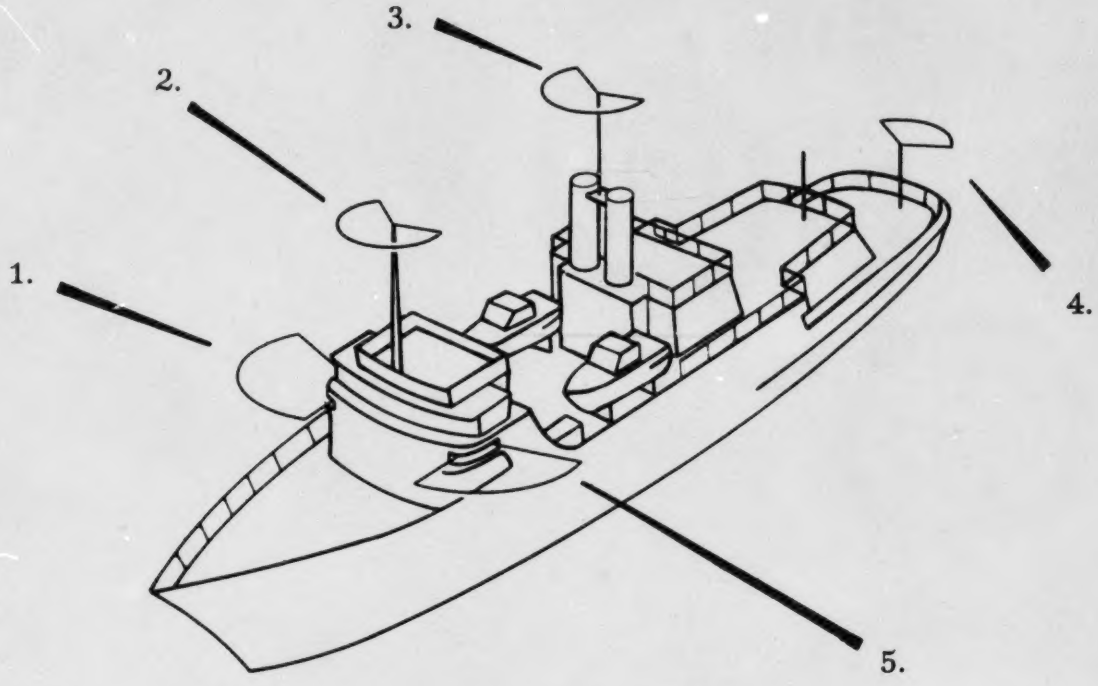
4. **Aim:**
   Can be seen from dead _____ to _____ either side of vessel.
   Rule 21(c), p. 26.

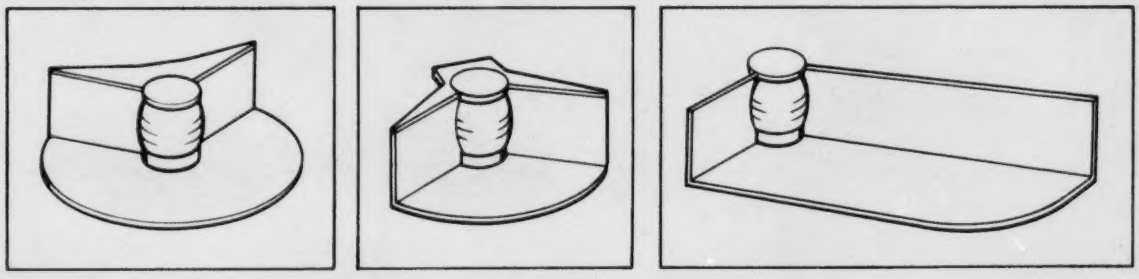
If you missed any questions, go back and study Page 52. Then repeat the exercise.

SELF QUIZ —RUNNING LIGHTS

for each Running Light:
—select the **graphic** of the light
—write the **name**
—write the **color**
—write the **location**
—write the **arc**
—write the **aim**

(USE NOTE PAPER—DO NOT WRITE IN THIS BOOKLET)





GRAPHIC A GRAPHIC B GRAPHIC C

Self Quiz—Running Lights

ANSWERS

1. Starboard Sidelight
   Graphic C
   Color Green
   Location Starboard
   Arc 112.5°
   Aim dead ahead to 22.5° abaft beam

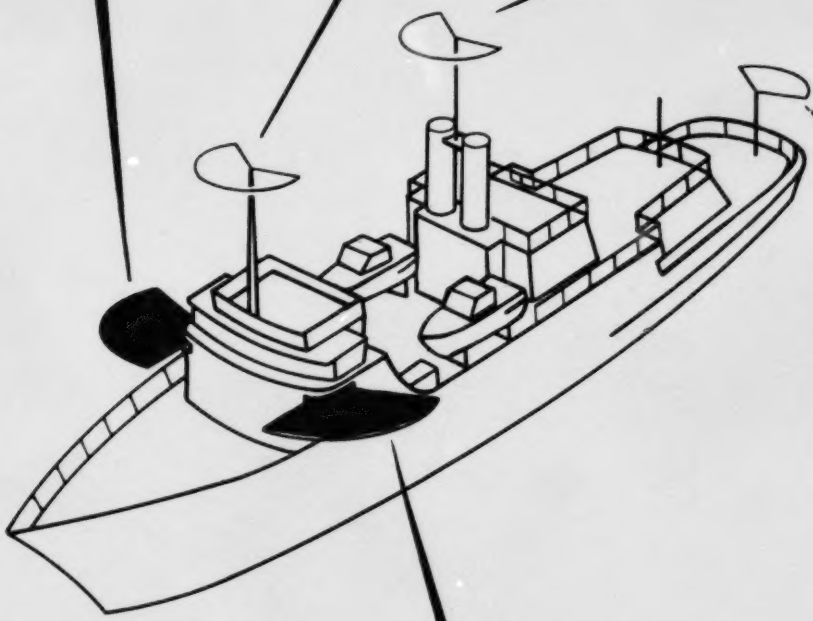
   Rule 21(b), p. 24.

2. Masthead Light
   Graphic A
   Color White
   Location over fore and aft center line
   Arc 225°
   Aim dead ahead to 22.5° abaft beam either side.

   Rule 21(a), p. 24.

3. Masthead Light
   Graphic A
   Color White
   Location abaft and higher than forward masthead light
   Arc 225°
   Aim dead ahead to 22.5° abaft beam either side.

   Rule 23(a)(ii), p. 24.



4. Sternlight
   Graphic B
   Color White
   Location stern
   Arc 135°
   Aim dead astern to 67.5° either side

   Rule 21(b), p. 24.

5. Port Sidelight
   Graphic C
   Color Red
   Location Port
   Arc 112.5°
   Aim dead ahead to 22.5° abaft beam

   Rule 21(b), p. 24.

—Repeat this exercise until you can recall the characteristics of each light correctly and easily.
—Next you will learn the characteristics of each Special Lights.

SECTION V

APPLYING RULES AND REGULATIONS

DESCRIPTION OF TASK CATEGORY

Rules are established practices or stated regulations that serve as guides to action. They are frequently expressed as If/Then statements (i.e., If this happens, then do this). The requirement here is to identify situations that are subject to rules, select the proper rule, and apply it correctly. Since rules are expressed through words, formulas, and equations, an understanding of the precise meaning of words in the rule becomes important. Similar to the task category Performing Procedures, the rule must first be remembered before it can be applied.

Six examples of objectives involving rule application are provided below to illustrate the types of learning objectives representative of the category.

1. Given an American flag, an Illinois state flag, and a specific command flag on poles with stands, ARRANGE them on a speaker's platform in accordance with U.S. Navy directives.

2. Using information from simulated personnel records, COMPUTE Active Duty Service Dates (ADSD).

3. Provided a scenario concerning damage to a ship requiring implementation of damage control procedures, PREPARE a Damage Control Message in accordance with U.S. Navy directives.

4. Using the outline contained in OPNAVINST 5500.1 as a guide, DESTROY simulated classified documents.

5. Using procedures in OPNAVINST 3120.32, TAG OUT a Cutler Hammer Elevator.

6. Given the depth, number of divers, and work to be performed for a typical working dive, COMPUTE the compressor output necessary to sustain the divers safely. The answer must be within ± 10 psi of the correct answer.

LEARNING STRATEGY

Both learning a rule and applying it are normally combined into a single learning strategy. Individual words are defined that represent the key concepts embedded in the rule. Then the rule is presented with the requirement to restate the rule. To further clarify the meaning of the rule, examples should be presented showing where the rule applies and where it does not apply. Examples also point out exceptions to the general rule. Opportunity is provided to practice applying the rule to new situations. These situations should be selected from a broad range of possible situations where the rule does apply. Also included in the practice exercise are ambiguous situations where the rule appears to apply, but does not. Correct solutions are provided with immediate feedback and reinforcement for correct application of the

rule. After two or more related rules have been examined and applied in this manner, longer exercises are presented which provide practice in applying a number of related rules to a wide range of job-related situations. Applying the appropriate rules in the context of an operational-like setting not only supports the transfer of learning from the classroom to the job site but also stimulates motivation for rule learning.

FORMAT MODEL

The format model demonstrates how to design instructional material according to this learning strategy. The sample training task used in the model which is presented next concerns the International Rules of the Road for lighting vessels at night. There are six separately numbered pages in this format model. Page 1 shows how to define the key terms used in the rule and how to state the rule. It also shows situations where the rule does and does not apply. Page 2 is an exercise in recalling the information presented on type 1 pages. Applying a single rule is the subject of the exercise presented on page 3, and the answers to this exercise are provided on page 4. An exercise calling for the application of multiple rules and the answers to this exercise are shown on pages 5 and 6, respectively.

Following the format model presentation, another example is provided which shows how the model can be used to design materials for the task of learning to use correct protocol for an enlisted person when saluting an officer.

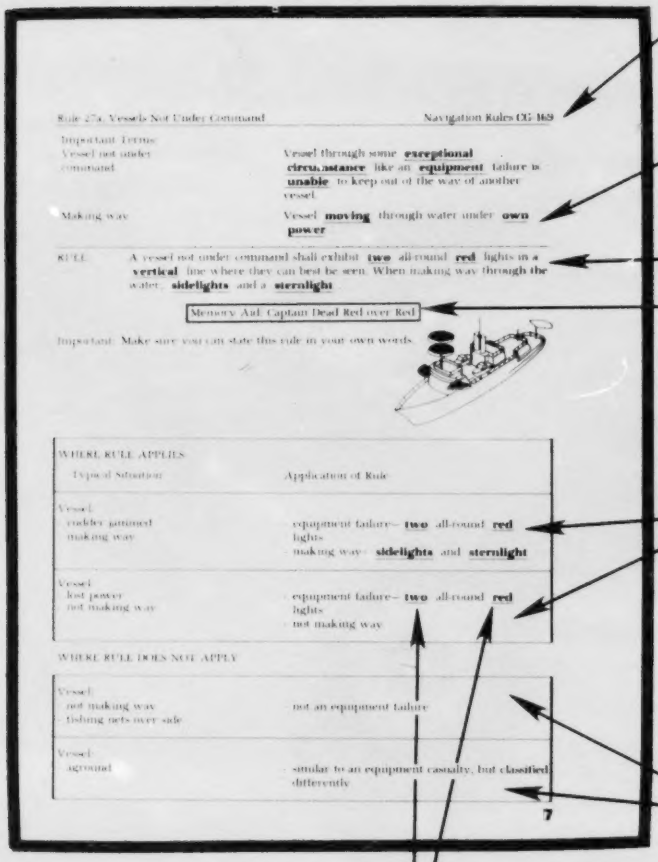
FORMAT MODEL
APPLYING RULES AND REGULATIONS

A general format for use in designing training materials to teach the recall of rules, and the application of these rules in typical job situations.

Rules and Regulations Format Model - Page 1

Use this page format to present a rule.

The purpose of this page format is to:
- define the terms in the rule.
- present the rule.
- present a memory aid, if needed.
- show situations where the rule applies.
- show situations where the rule does not apply.


Rule 27a. Vessels Not Under Command
Navigation Rules CG-169
Important Terms:
Vessel not under command
Vessel through some exceptional circumstance like an equipment failure is unable to keep out of the way of another vessel
Making way
Vessel moving through water under own power
RULE
A vessel not under command shall exhibit two all-round red lights in a vertical line where they can best be seen. When making way through the water, sidelights and a sternlight
Memory Aid: Captain Dead Red over Red
Important: Make sure you can state this rule in your own words.
WHERE RULE APPLIES
Typical Situation
Application of Rule
Vessel:
- rudder jammed
- making way
- equipment failure— two all-round red lights
- making way— sidelights and sternlight
Vessel:
- lost power
- not making way
- equipment failure— two all-round red lights
- not making way
WHERE RULE DOES NOT APPLY
Vessel:
- not making way
- fishing nets over side
- not an equipment failure
Vessel:
- aground
- similar to an equipment casualty, but classified differently
7

Give name of rule and its source.

Define special terms used in rule - or needed to understand rule.

State the rule.

Create a memory aid when what is to be recalled is easily confused with other memorized information.*

Describe typical situations where the rule applies. Sample from the entire range of situations.

Describe the most common situations where individuals mistakenly think the rule applies.

Underline key words which will prompt recall.

*Use TAEG Report No. 60, *Use of Mnemonics in Training Materials: A Guide for Technical Writers*, for help in creating memory aids.

Rules and Regulations Format Model - Page 2

Use this page format immediately following each use of the page 1 format.

The purpose of this page format is to:
- focus student attention to key words.
- exercise the students' recall of the meaning of the rule.

Copy the previous page. Then drop out key words that were underlined on the previous page.

Rule 27a. Vessels Not Under Command — Navigation Rules CG-169

Important Terms:

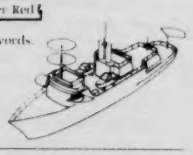
Vessel not under command: Vessel through some _____ _____ like an _____ failure is _____ to keep out of the way of another vessel.

Making way: Vessel _____ through water under _____

RULE: A vessel not under command shall exhibit ___ all-round ___ lights in a _____ line where they can best be seen. When making way through the water, _____ and a _____

Memory Aid: Captain Dead Red over Red

Important: Make sure you can state this rule in your own words.



WHERE RULE APPLIES

Typical Situation	Application of Rule
Vessel: - rudder jammed - making way	- equipment failure— ___ all-round ___ lights - making way— _____ and _____
Vessel: - lost power - not making way	- equipment failure— ___ all-round ___ lights - not making way

WHERE RULE DOES NOT APPLY

Vessel: - not making way - fishing nets over side	- not an equipment failure
Vessel: - aground	- similar to an equipment casualty, but classified differently.

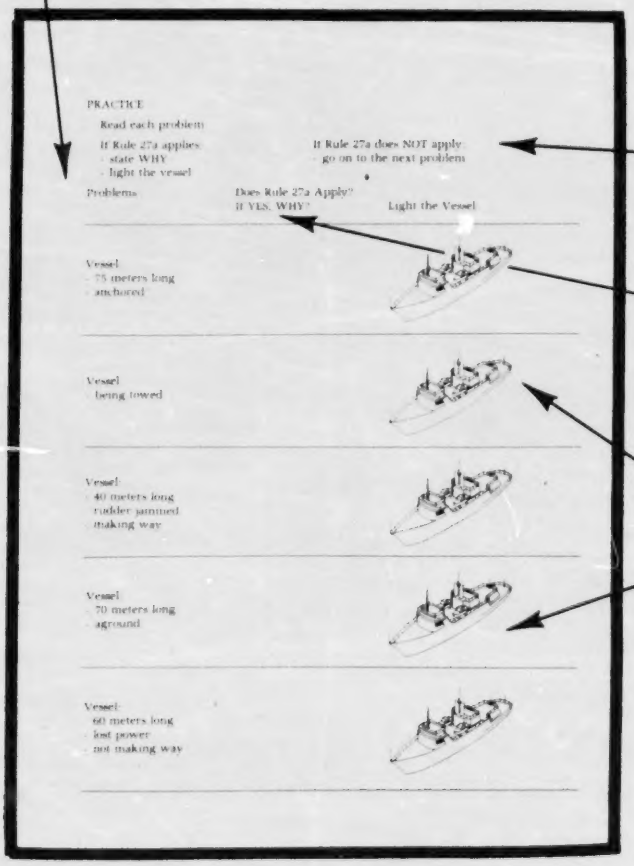
Rules and Regulations Format Model - Page 3

Use this page format immediately after presenting a rule (page 1) and exercising the recall of the rule (page 2).

The purpose of this page format is to present a number of examples which provide exercise in determining:

- situations where the rule applies.
- situations where the rule does not apply.

Present a list of job related problems where the rule applies and doesn't apply.



Modify the directions for your rule.

Ask if rule applies and ask why only when needed.

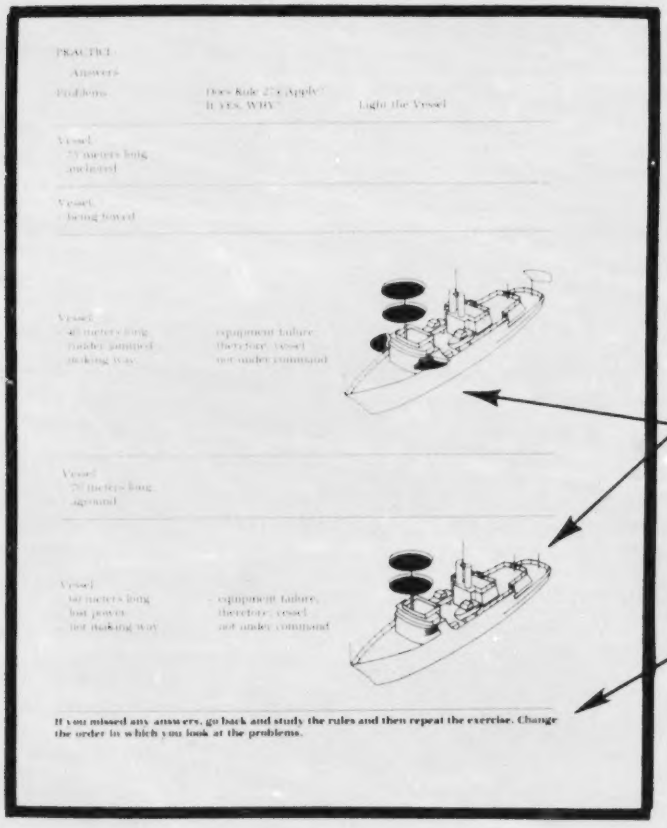
Create visual situations where the rule can be applied.

Rules and Regulations Format Model - Page 4

Use this answer page format immediately after presenting an exercise with page format 3.

The purpose of this page format is to:

- present answers to exercises.
- state directions for further practice, if needed.



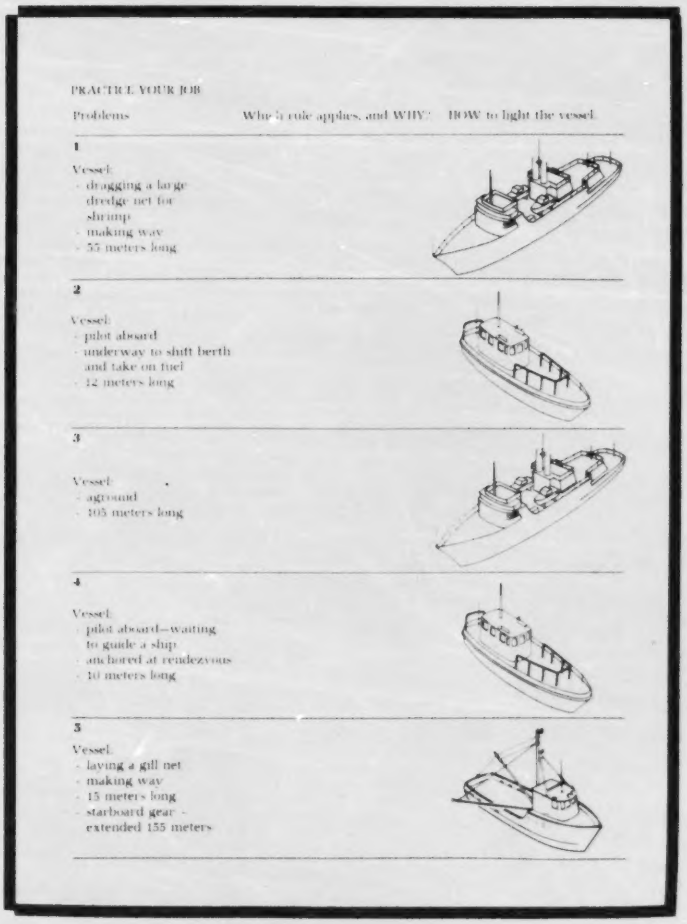
Record correct answers in those instances where the rule applies.

Present this direction on last answer page for exercise.

Rules and Regulations Format Model - Page 5

Use this page format after presenting a set of up to 6 related rules using page formats 1, 2, 3, and 4.

The purpose of this page format is to give the student an opportunity to exercise selection of the correct rule in typical job situations, and to exercise correct applications of the rule.



PRACTICE YOUR JOB

Problems	Which rule applies, and WHY?	HOW to light the vessel
1 Vessel: - dragging a large dredge net for shrimp - making way - 55 meters long		
2 Vessel: - pilot aboard - underway to shift berth and take on fuel - 12 meters long		
3 Vessel: - aground - 105 meters long		
4 Vessel: - pilot aboard—waiting to guide a ship - anchored at rendezvous - 10 meters long		
5 Vessel: - laying a gill net - making way - 15 meters long - starboard gear - extended 155 meters		

Use more pages if necessary to present a range of problems for each of the rules.

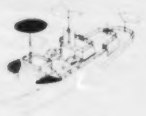
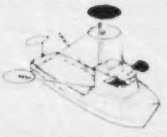
Rules and Regulations Format Model - Page 6

Use this page format immediately following each use of the page 5 format.

The purpose of this page format is to provide answers to the rule applications exercise.

PRACTICE YOUR JOB

Answers

Problems	Which rule applies, and WHY?	HOW to light the vessel
1 Vessel: - dragging a large dredge net for shrimp - making way - 55 meters long	Trawling - dragging a dredge net - making way - more than 50 meters (See Rule 26(b))	
2 Vessel: - pilot aboard - underway to shift berth and take on fuel - 12 meters long	Power-driven Vessels Underway (See Rule 23)	
3 Vessel: - aground - 105 meters long	Anchored Vessels and Vessels Aground - aground - more than 50 meters - more than 100 meters (See Rule 30)	
4 Vessel: - pilot aboard—waiting to guide a ship - anchored at rendezvous - 10 meters long	Pilot Vessels - vessel engaged in pilotage duties - anchored (See Rule 29)	
5 Vessel: - laying a gill net - making way - 15 meters long - starboard gear extended 155 meters	Fishing - Using fishing apparatus that restricts maneuverability - making way - boom extended starboard (See Rule 26(c))	

Present this direction on last answer page for exercise.

REPEAT THIS EXERCISE UNTIL YOU CORRECTLY APPLY THE APPROPRIATE RULE TO EACH PROBLEM.

EXAMPLE: HAND SALUTING OFFICERS

Learning Objective: Given a description of a situation involving an enlisted sailor with an officer of the armed forces, WRITE yes for those situations where a salute is appropriate.

There are several rules governing when to salute an officer. The example contains a page layout for presenting two of these rules along with a page layout for an exercise on rule application. Note how the examples serve to further define the rules by showing exceptions. The complete instructional module includes the remainder of the rules and a large exercise which provides practice ir applying the rules to many job-related situations. The rules presented here were taken from the United States Navy Regulations (1973), Basic Military Requirements, NAVTRA 10054-D (1973), and the Curriculum Outline for U.S. Navy Recruit Training, X777-7770 (1982).

Rule 1. Salute Only When Covered and in Uniform - U.S. Navy Regulation 1009.3

IMPORTANT TERMS:

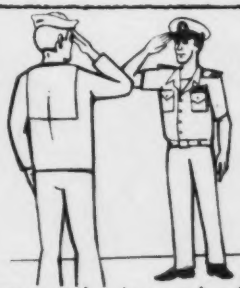
TERMS	MEANINGS	REFERENCES
covered	headgear on, usually outdoors	Basic Military Requirements, Glossary, p. 298
indoors	in building, in inner court, in open passageway between buildings	Basic Military Requirements, p. 35

RULE: Salute only when covered* and in uniform.

*Not usually covered indoors.

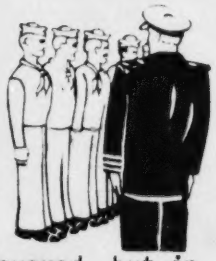
IMPORTANT: Make sure you can state this rule in your own words.

SALUTE

Typical Situation	Application of Rule	Typical Situation	Application of Rule
You are in uniform walking back to the barracks when you see a captain approaching you on the same side of the street.	covered,	You are reporting for duty (covered) and you are approaching the division officer's desk.	covered, reporting
You watch an officer enter the boat you are on.	covered, officer entering boat	You are standing the barracks security watch.	 covered, (sound off with name and rate.)

Rule 1 continued

DO NOT SALUTE

Typical Situation	Application of Rule	Typical Situation	Application of Rule
You are performing clerical work when an officer approaches your desk.	uncovered	In ranks, outdoors, the commanding officer passes near to your group.	 covered, but in ranks
On a bus, you are standing, covered, near to a lieutenant and he makes eye contact.	covered, but crowded area	A woman in the Navy, indoors with headgear on, is addressed by an officer.	Women in the Navy remain covered indoors.

- If Rule 1 applies to a problem:
  - State WHY rule applies
- If Rule 1 does not apply:
  - State the exception

PROBLEMS	WHY Rule 1 Applies/ Exception	Salute?	PROBLEMS	WHY Rule 1 Applies/ Exception	Salute?
You are in ranks as an officer makes an inspection.			At mess, an officer addresses you.		
In a plane you pass by a Navy lieutenant when going to your seat, and you haven't taken your hat off yet.			You are record-keeping at the Post Office when you meet an officer.		
You are standing watch in a sentry box when an officer approaches.			You are outside in a work detail, covered, and a captain addresses you. The man in charge of the detail is nowhere in sight.		
Outside the Navy Exchange you (covered) pass near an ensign.			You are at oars in a pulling boat.		

PRACTICE

ANSWERS

PROBLEMS	WHY Rule 1 Applies/ Exception	Salute?	PROBLEMS	WHY Rule 1 Applies/ Exception	Salute?
You are in ranks as an officer makes an inspection.	in ranks	NO	At mess, an officer addresses you.	uncovered	NO
In a plane you pass by a Navy lieutenant when going to your seat, and you haven't taken your hat off yet.	crowded area	NO	You are record-keeping at the Post Office when you meet an officer.	uncovered	NO
You are standing watch in a sentry box when an officer approaches.	covered, meeting an officer	YES	You are outside in a work detail, covered, and a captain addresses you. The man in charge of the detail is nowhere in sight.	covered and addressed by an officer	YES
Outside the Navy Exchange you (covered) pass near an ensign.	covered and passing near an officer	YES	You are at oars in a pulling boat.	both hands are occupied	NO

Rule 2. Occasions for Rendering Hand Salutes - U.S. Navy Regulation 1010.2

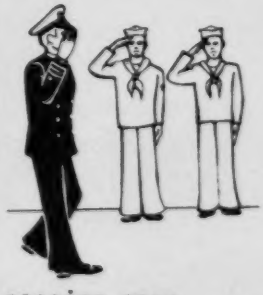
IMPORTANT TERMS:

TERMS	MEANINGS	REFERENCES
Officer	Commissioned Officer of U.S., some Foreign Armed Services, Coast Guard	U.S. Navy Regulations
Detail	Body of persons selected for a particular task	Webster's New Collegiate Dictionary
Pace	24 in. for woman 30 in. for man	Company Commanders' Guide

RULE: On shore, salute all officers (and Company Commanders while in Basic Training) on each meeting or passing near (6 paces) or when addressing or being addressed by such officers.

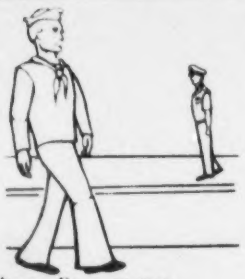
IMPORTANT: Make sure you can state this rule in your own words.

SALUTE

Typical Situation	Application of Rule	Typical Situation	Application of Rule
You are overtaking a Navy Officer on the sidewalk	 passing near, (Say, "By your leave, Sir/Ma'am.")	You see the commanding officer's sedan (with lights on) passing near you.	 passing near
You recognize an officer who approaches you, but she is wearing civilian clothes.	 meeting	You are in a small informal group when one of you sees the commanding officer approaching and calls "attention."	 passing near

Rule 2 continued

DO NOT SALUTE

Typical Situation	Application of Rule	Typical Situation	Application of Rule
A Navy captain passes you on the other side of the street.	 too far away	You are driving your car and pass by a Navy commander.	driving a car
You are part of a work detail. A lieutenant walks up to your group.	only person in charge salutes	You have both hands full when an officer addresses you.	both hands occupied

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If Rule 2 applies to a problem:
- State WHY rule applies

If Rule 2 does not apply:
- State the exception

PROBLEMS	WHY Rule 2 Applies/ Exception	Salute?	PROBLEMS	WHY Rule 2 Applies/ Exception	Salute?
You are guarding prisoners when an ensign passes your detail.			A chief petty officer is Officer of the Deck, and you are requesting permission to come aboard.		
Aboard ship, you pass a lieutenant for the second time that day.			A chief warrant officer greets you as you pass by.		
You are about to address a Navy officer (when covered).			You walk past a Coast Guard officer who is in uniform.		
You are part of a formation that marches by an officer.			A lieutenant, riding a bicycle, passes you.		
You are playing football when a lieutenant stops to watch from the sidelines.			After you have graduated from Basic Training, you meet a company commander.		

ANSWERS

PROBLEMS	WHY Rule 2 Applies/ Exception	Salute?	PROBLEMS	WHY Rule 2 Applies/ Exception	Salute?
You are guarding prisoners when an ensign passes your detail.	guarding prisoners	NO	A chief petty officer is Officer of the Deck, and you are requesting permission to come aboard.	Petty officer is performing duty normally assigned to a commissioned officer.	YES
Aboard ship, you pass a lieutenant for the second time that day.	salute officer first time only	NO	A chief warrant officer greets you as you pass by.	Salute a commissioned officer when addressed.	YES
You are about to address a Navy officer (when covered).	Salute when addressing an officer.	YES	You walk past a Coast Guard officer who is in uniform.	Salute when passing an officer.	YES
You are part of a formation that marches by an officer.	in ranks	NO	A lieutenant, riding a bicycle, passes you.	Salute when passing near an officer.	YES
You are playing football when a lieutenant stops to watch from the sidelines.	engaged in athletic activities	NO	After you have graduated from Basic Training, you meet a company commander.	not in Basic Training	NO

PRACTICE YOUR JOB

This exercise takes you through some typical situations.

- For each problem, if a salute is appropriate:
  - State YES if a salute is called for
- If a salute is not appropriate
  - State the exception to the rule
  - State NO if a salute is not called for

PROBLEMS	Exception?	Salute?	PROBLEMS	Exception?	Salute?
You are marching in ranks to the galley when a lieutenant commander passes by.			You are waiting in a room with other recruits when a captain enters.		
You are outside in charge of a work detail, when your company commander approaches your group.			You are standing quarterdeck watch (covered) inside a building when an officer approaches.		
Walking over to the dispensary, you pass an officer driving his car.			When you are playing baseball a Navy officer stops to watch the game.		
You are covered and a passenger in a Navy vehicle when you make eye contact with a captain.			While on liberty, you are covered and in uniform when you meet an officer in a crowded area in front of a theater.		
During your participation in fire fighting exercises, the commanding officer reviews the activities.			You are uncovered in an open passageway between wings of a building when an officer addresses you.		

PRACTICE YOUR JOB

ANSWERS

PROBLEMS	Exception?	Salute?	PROBLEMS	Exception?	Salute?
You are marching in ranks to the galley when a lieutenant commander passes by.	covered, but in ranks	NO	You are waiting in a room with other recruits when a captain enters.	inside	NO
You are outside, in charge of a work detail, when your company commander approaches your group.		YES	You are standing quarterdeck watch (covered) inside a building when an officer approaches.		YES
Walking over to the dispensary, you pass an officer driving his car.		YES	When you are playing baseball a Navy officer stops to watch the game.	engaged in athletic activity	NO
You are covered and a passenger in a Navy vehicle when you make eye contact with a captain.		YES	While on liberty, you are covered and in uniform when you meet an officer in a crowded area in front of a theater.	covered, but in a crowded area	NO
During your participation in fire fighting exercises, the commanding officer reviews the activities.	covered, but engaged in a potentially dangerous activity	NO	You are uncovered in an open passageway between wings of a building when an officer addresses you.	uncovered, inside	NO

SECTION VI

CLASSIFYING OBJECTS AND SIGNALS

DESCRIPTION OF TASK CATEGORY

Classification involves assigning an object or signal to a category based on certain identifiable characteristics and then labeling it with the category name. Objects or signals placed in a given category usually are not identical--they merely have a set of similar characteristics; i.e., "sub" contacts in sonar returns may appear to be very different, yet they exhibit certain similar qualities that mark them as "submarines." Knowing the essential features which define a category and knowing how to distinguish one category from another according to similar features is the basis of classification.

Three examples of classification objectives are provided below which illustrate the types of learning objectives that are representative of this category.

1. Given video tapes of five accident victims and written descriptions of their symptoms, IDENTIFY which victims are in shock. State your answer by circling the case number of the shock victims.

2. Given 10 scope photographs of intercepted radar signals, IDENTIFY, by labeling, the source radar as either early warning, surveillance, or intercept.

3. Given five pictures showing the interior/exterior of a ship that has sustained damage, IDENTIFY, by labeling, those instances which would warrant initiation of damage control procedures.

LEARNING STRATEGY

In the classification format, the material is organized around critical distinguishing visual features used in assigning an object or signal to a category. The cues are presented and differences between closely related features are clearly identified if these differences are important in the classification task. If possible, the cues are labeled with terms that are remembered as mental pictures rather than as abstract words; mnemonics are used where appropriate.

Simple conditional rules in the form, "If you see..., then you know..." are presented as guides to be used in classifying. Examples of many different forms of the class are presented in pictorial form in the exercises in the instructional module.

Early in training, students are given the opportunity to practice classifying skills with a single category of objects or signals. A few distractors are added to increase challenge during practice. Later in training, practice is provided in classifying examples from several categories at once,

including those that appear very similar. Answer pages following the exercises provide knowledge of correctness of response.

FORMAT MODEL

The format model demonstrates how to design instructional material according to the learning strategy for classifying objects and signals. The sample training task used in the classifying format model presented next concerns recognizing light patterns of vessels at night in international waters. There are six separately numbered pages in this format model. Page 1 of the model shows how to present the cues used in classifying objects and signals of a specific class and also examples that demonstrate the range of objects or signals that fall in that class. Page 2 is an exercise for recalling page 1 type information. Page 3 enables practice in classifying objects or signals of a single class. Answers to this exercise are presented on page 4. Page 5 of the format model enables practice in classifying a number of objects or signals into various classes, and page 6 provides the correct answers. How to sequence these pages for effective learning is also described.

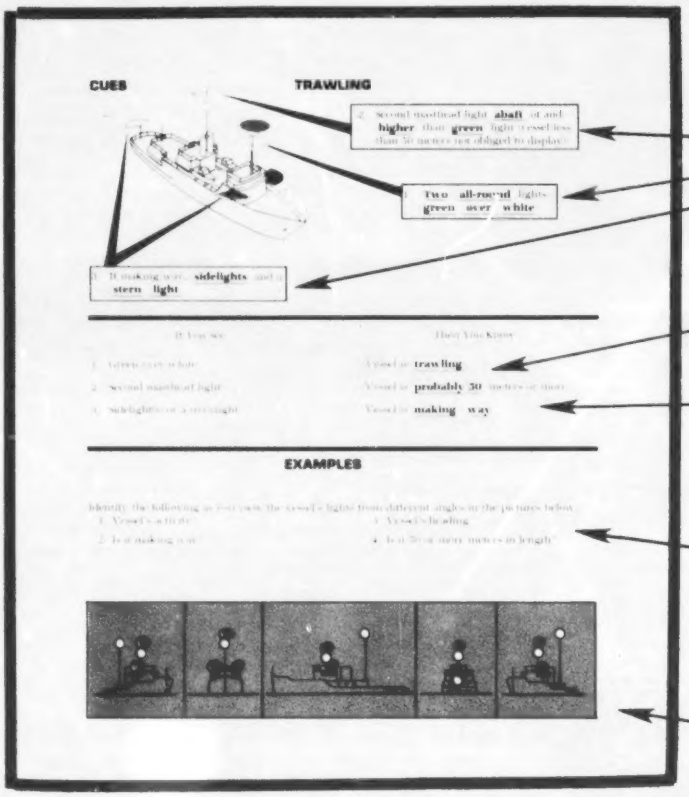
Following the format model, an expanded version of material covering the same task is provided.

FORMAT MODEL
CLASSIFYING OBJECTS AND SIGNALS

A general format for use in designing training materials to teach the recognition of signals on equipment displays, or the recognition of objects or conditions in typical job situations.

Classifying Objects and Signals Format Model - Page 1

Use this page format to initially present the cues used in recognizing and classifying a specific type signal, object or condition. A page like this is created for each different class to be recognized.



Present just those cues that are used in classifying the object or event.

Underline key words.

Create self-directions; i.e., easily remembered rules as guides in classifying.

Modify the directions for your type of classifying task.

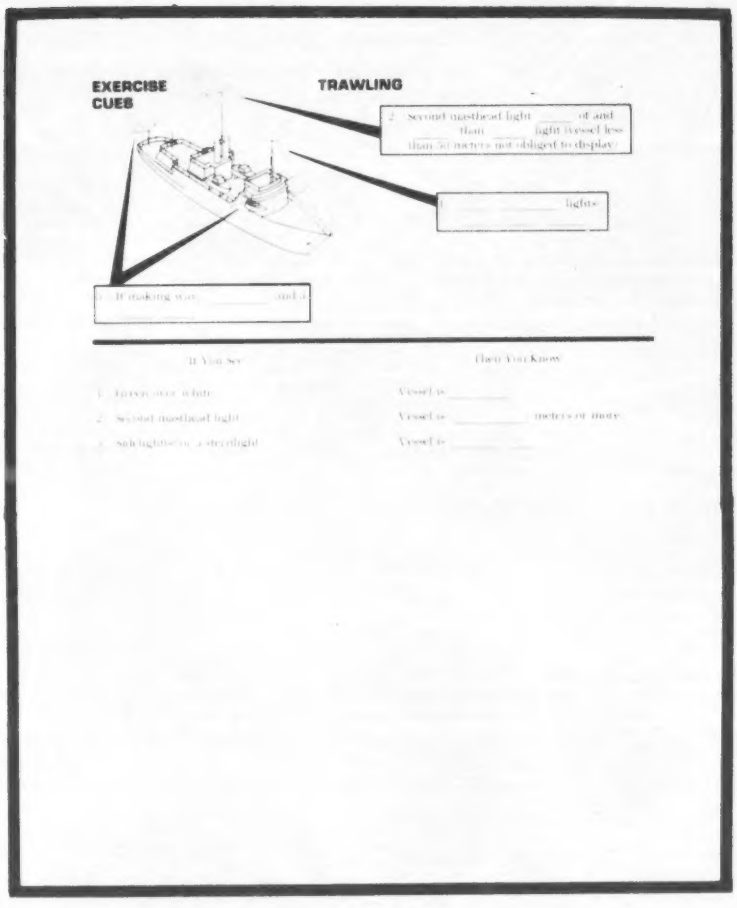
Make sure you illustrate each of the conditions listed above in "IF YOU SEE, THEN YOU KNOW."

Classifying Objects and Signals Format Model - Page 2

Use this page format immediately following each use of the page 1 format.

The purpose of this page format is to:
- focus student attention on key words.
- provide students exercise in the recall of classifying cues.

Copy the previous page which presents how to classify an object or event; then drop out key words that were underlined on the previous page.

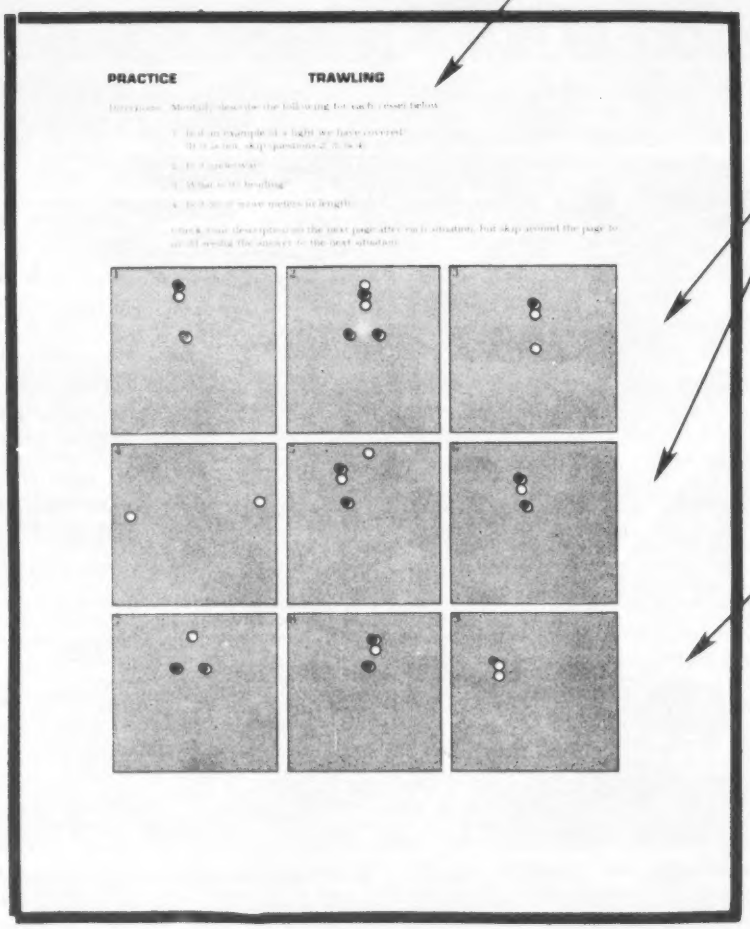

EXERCISE CUES
TRAWLING
2. Second masthead light _____ of and _____ than _____ light (vessel less than 50 meters not obliged to display)
_____ lights
If You See
Then You Know

Classifying Objects and Signals Format Model - Page 3

Use this page format immediately following each use of the page 2 format.

The purpose of this page format is to:
- present examples of a single class of signals, objects or conditions to be classified.
- exercise the students in using the classifying cues to recognize instances of a single class of signals, objects or conditions.

List questions that are appropriate for the classifying problem.



Present many different views of the object or event being classified.

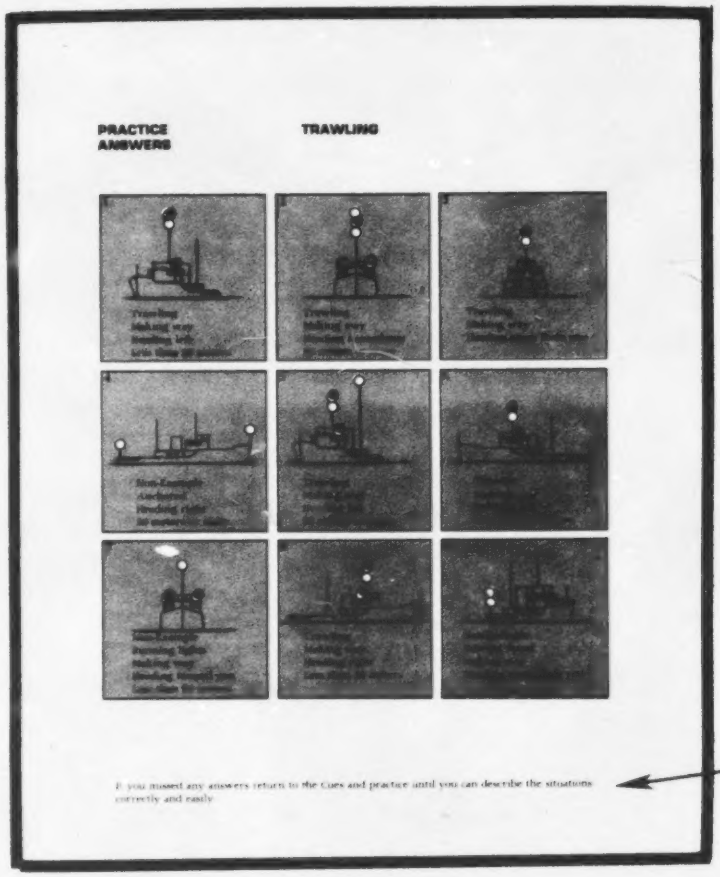
Include 1 or 2 views that are not of the class being studied.

Classifying Objects and Signals Format Model - Page 4

Use this page immediately following each use of the page 3 format.

The purpose of this page format is to present the answers to the exercise presented with the page 3 format.

Copy the exercise page, and add the answers.
Where possible, annotate or enhance the image
to make the correct answer more apparent.


PRACTICE ANSWERS
TRAWLING
If you missed any answers return to the Cues and practice until you can describe the situations correctly and easily

Present directions stressing repetition.

Classifying Objects and Signals Format Model - Page 5

Use this page in two situations:

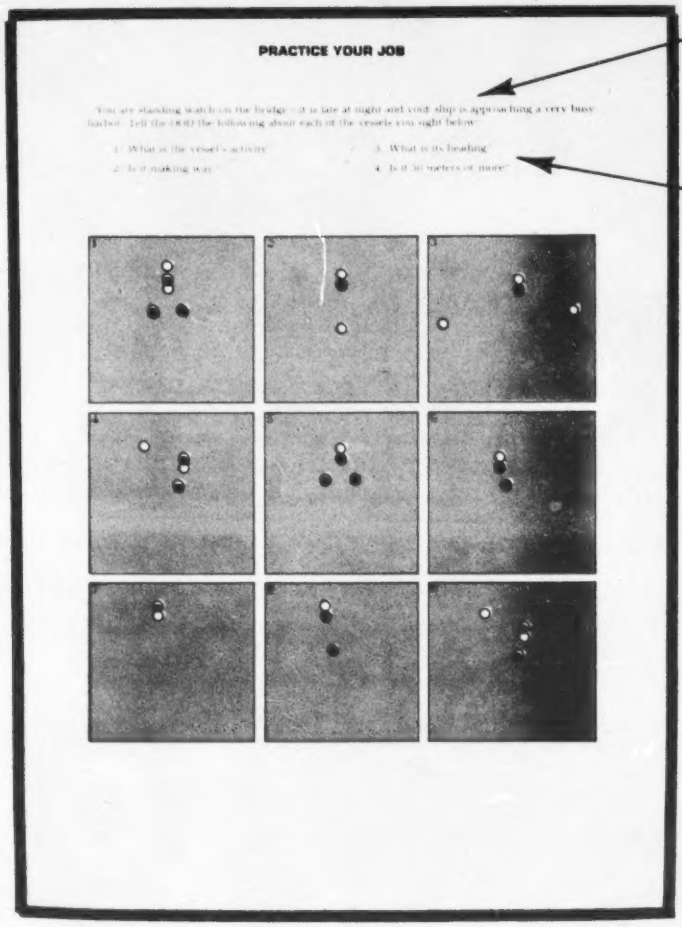
(1) after using page 1, 2, 3, and 4 formats with two classes.

and

(2) after using page 1, 2, 3 and 4 formats with all (or a major set of classes).

The purpose of this page is to present two types of exercises:

- Pair Exercises - to exercise the students in recalling the cues and using them in recognizing instances of two classes.
- Large Exercises - to present similar exercises covering many separate classes.



Create a scenario of a job situation in which the skill will be required.

Create directions to your classification task.

Select a broad range of views from earlier exercises. Add new views. Present views in a random order.

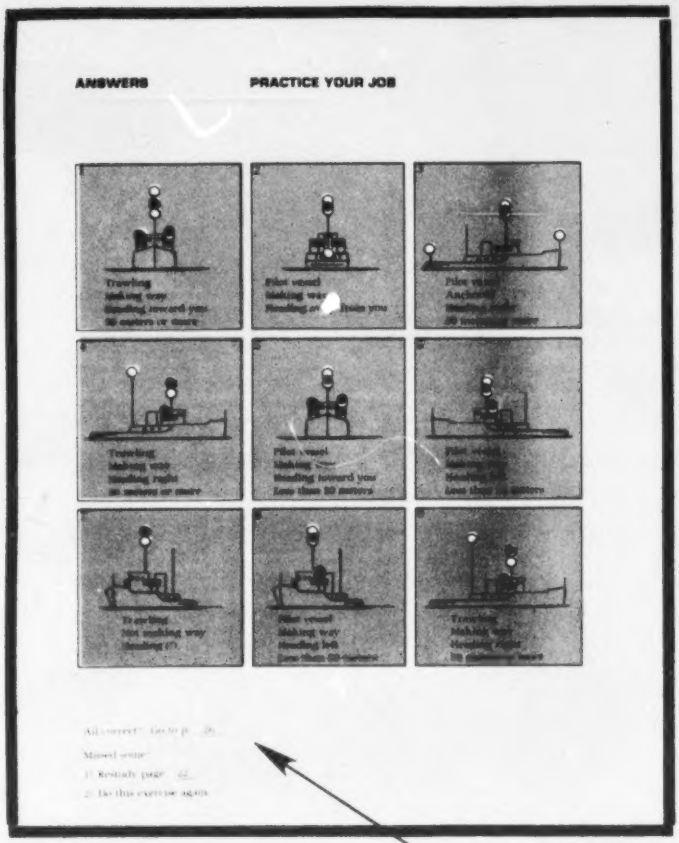
Use more pages if necessary to present a range of views of all objects or events being classified.

Classifying Objects and Signals Format Model - Page 6

Use this page immediately after the use/each instance of the page 5 format.

The purpose of this page is to present the answers to the exercise presented with the page 5 format.

Place an answer page immediately following each practice page.



Copy the exercise page, and add the answers. Where possible, annotate or enhance the image to make the correct answer more apparent.

Present this direction on last answer page for exercise.

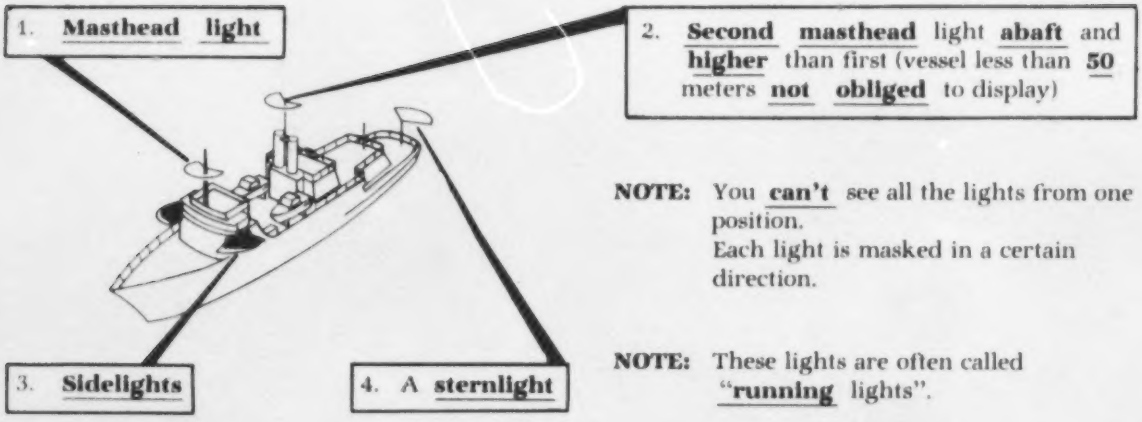
EXAMPLE: CLASSIFYING VESSELS ACCORDING TO THEIR VISIBLE LIGHTS

Learning Objective: Given a picture of the lights of a vessel in international waters as seen from a distance at night, IDENTIFY, in writing, the activity, direction, and other general characteristics of the vessel.

This example presents part of an instructional module designed to teach recognition of light patterns of vessels at sea. Navigation Rules, International-Inland, CG-169 (1977) is used as a reference. The complete instructional module presents a large number of categories of vessel activity. For the purpose of this example, two categories with accompanying exercises are sufficient. A longer exercise providing practice in classifying two categories at once is also presented. A self-test which covers all categories in the entire module is appended.

CUES

VESSEL UNDERWAY


1. Masthead light
2. Second masthead light abaft and higher than first (vessel less than 50 meters not obliged to display)
3. Sidelights
4. A sternlight

NOTE: You **can't** see all the lights from one position.
Each light is masked in a certain direction.

NOTE: These lights are often called "**running** lights".

If You See . . .	Then You Know . . .
1. Two masthead lights and one or two sidelights . . .	Vessel is **underway** , probably **50** meters or more in length.
2. One masthead light lower than the other and one sidelight . . .	headed in direction of **lower** light (red sidelight - headed **left**) (green sidelight - headed **right**)
3. One masthead light and 2 sidelights . . .	headed **toward** you (less than **50** meters in length)
4. One masthead light over the other and two sidelights . . .	headed **toward** you (more than **50** meters in length)
5. One white light—no other lights . . .	Vessel may be headed **away** from you.*

NOTE: If a vessel is **underway** and not engaged in a special activity, the light displays are the **same** whether it is **making way** or **not making way** .

***NOTE:** **Single** white lights are confusing. They may mean a variety of situations. Approach with caution.

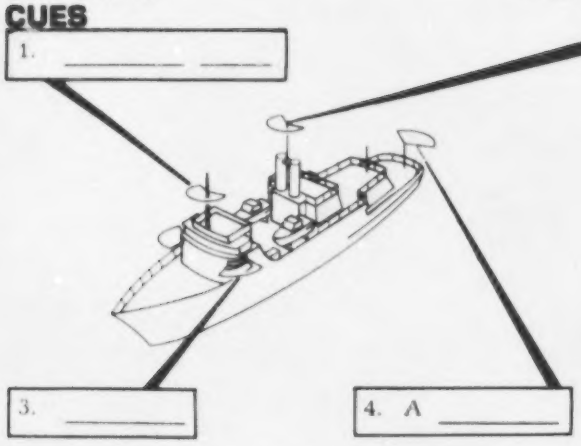
EXAMPLES

Identify the following as you view the vessel's lights from different angles in the pictures below:

1. Vessel's activity?
2. Is it underway?
3. Vessel's heading?
4. Is it 50 or more meters in length?

EXERCISE CUES

VESSEL UNDERWAY



NOTE: You _____ see all the lights from one position.
Each light is masked in a certain direction.

NOTE: These lights are often called "_____ lights".

If You See . . .	Then You Know . . .
1. Two masthead lights and one or two sidelights . . .	Vessel is _____ , probably __ meters or more in length.
2. One masthead light lower than the other and one sidelight . . .	headed in direction of _____ light (red sidelight - headed ____) (green sidelight - headed _____)
3. One masthead light and 2 sidelights . . .	headed _____ you (less than __ meters in length)
4. One masthead light over the other and two sidelights . . .	headed _____ you (more than __ meters in length)
5. One white light—no other lights . . .	Vessel may be headed _____ from you.*

NOTE: If a vessel is _____ and not engaged in a special activity, the light displays are the _____ whether it is _____ ___ or ___ _____ ___ .

***NOTE:** _____ white lights are confusing. They may mean a variety of situations. Approach with caution.

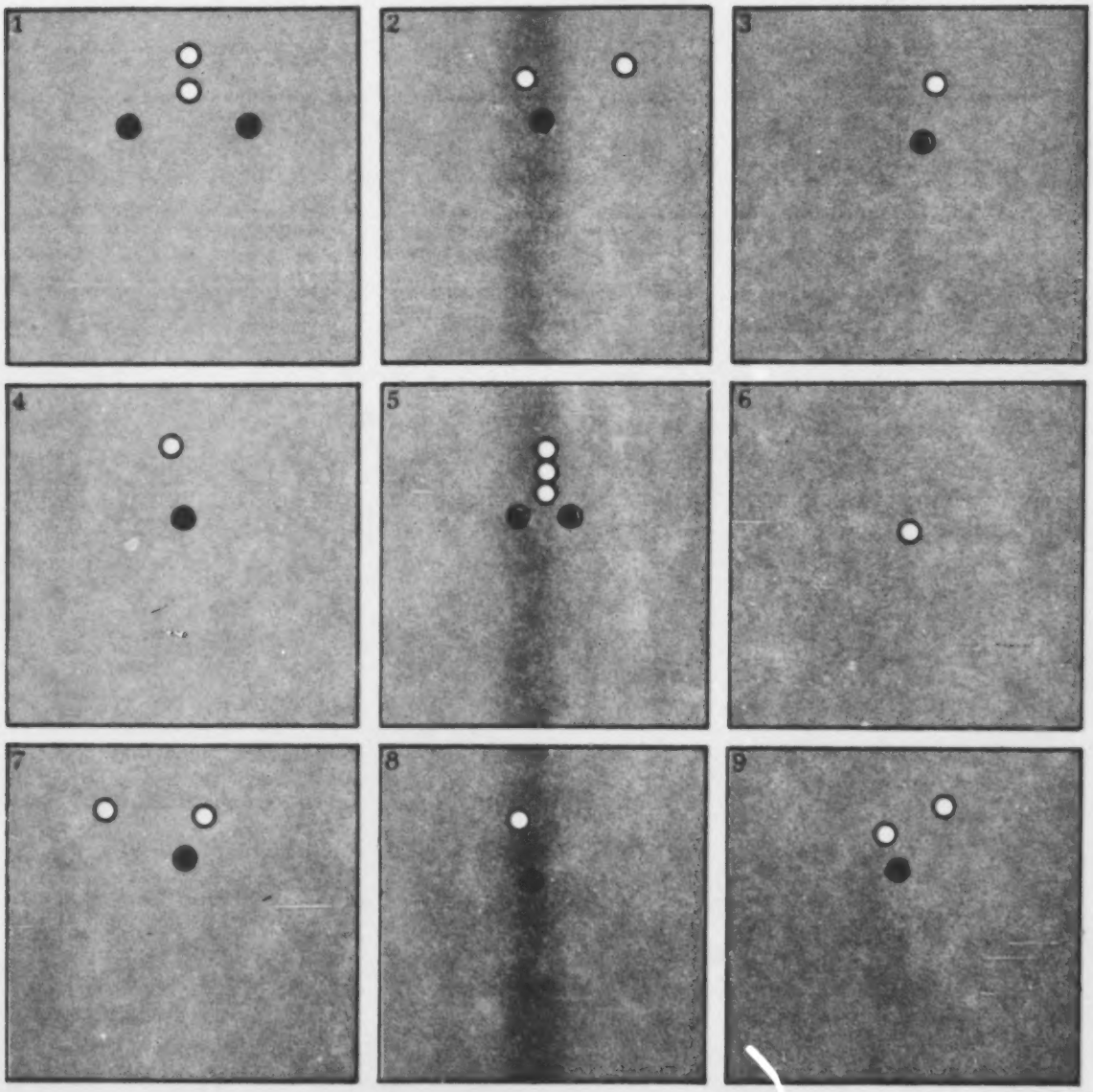
84

PRACTICE — VESSEL UNDERWAY

Directions: Mentally describe the following for each vessel below:

1. Is it an example of a light we have covered?
   (If it is not, skip questions 2, 3, & 4)
2. Is it underway?
3. What is its heading?
4. Is it 50 or more meters in length?

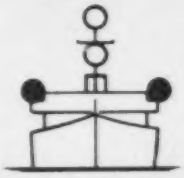
Check your description on the next page after each situation, but skip around the page to avoid seeing the answer to the next situation.



PRACTICE ANSWERS

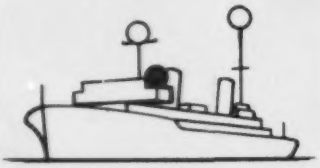
VESSEL UNDERWAY

1



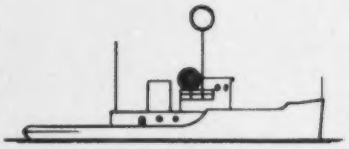
Underway
Heading toward you
50 meters or more

2



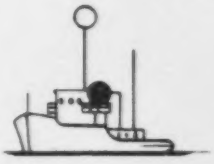
Underway
Heading left
50 meters or more

3



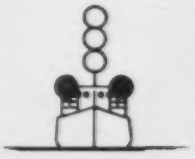
Underway
Heading right
Less than 50 meters

4



Underway
Heading left
Less than 50 meters

5

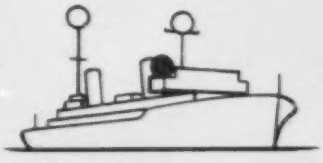


Non-example
Towing
Heading toward you
Underway
Tow more than 200 meters

6

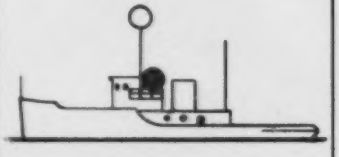
Cannot determine**

7



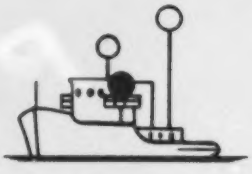
Underway
Heading right
50 meters or more

8



Underway
Heading left
Less than 50 meters

9



Underway
Heading left
50 meters or more

** NOTE: Single white lights are confusing. They can be: (1) Vessel underway headed away from you; (2) Anchor light on vessel less than 50 meters; (3) Anchor light on vessel 50 meters or more (second anchor light masked by vessel's superstructure).

All correct? Go to p. 90 .

Missed some?

1) Restudy page 86 .

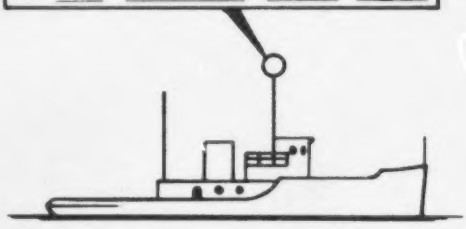
2) Do this exercise again.

96

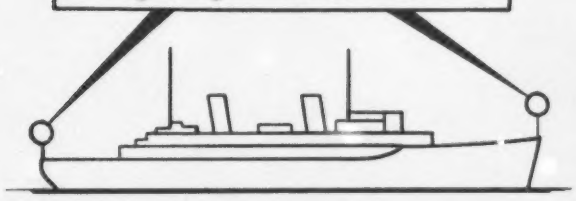
CUES

AT ANCHOR

1. Vessel less than 50 meters:
   One **all-round** **white** **light**



2. Vessel 50 meters or more:
   Two **all-round** **white** **lights**
   (higher light indicates bow)



NOTE: By definition, all-round lights show an unbroken arc of **360** degrees

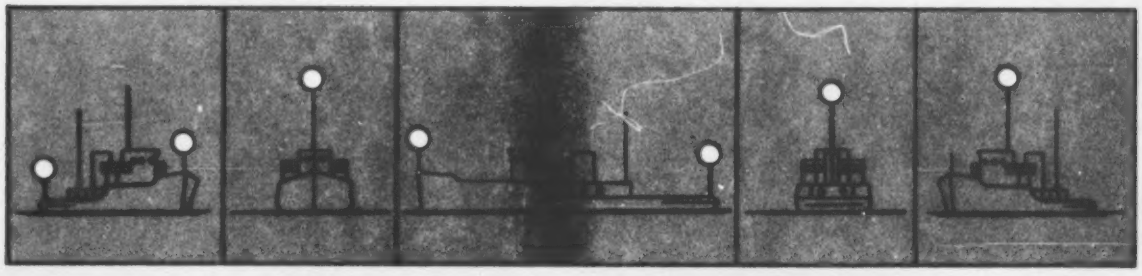
3. Vessels of **100** meters or more **must** **light** decks; less than 100 meters, may light decks.

If You See . . .	Then You Know . . .
1. One white light	Vessel may be at anchor, **less** than 50 meters in length. **NOTE:** Single white lights are confusing. They may indicate various things, and should be approached with caution.
2. Two white lights	Vessel at anchor, **probably** 50 meters or more in length.
3. One light higher	Vessel's **direction** (**higher** light indicates bow).

EXAMPLES

Identify the following as you view the vessel's lights from different angles in the pictures below:

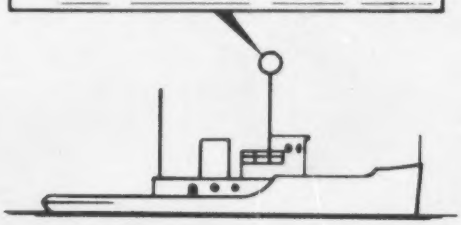
1. Vessel's activity?
2. Is it making way?
3. Vessel's heading?
4. Is it 50 or more meters in length?



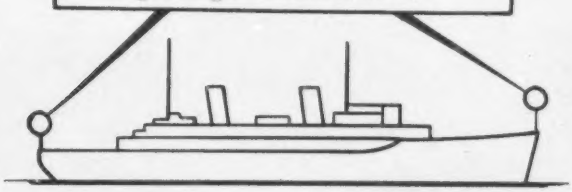
EXERCISE CUES

AT ANCHOR

1. Vessel less than 50 meters:
   ___ _____ _____ _____



2. Vessel 50 meters or more:
   ___ _____ _____ _____
   (higher light indicates bow)



NOTE: By definition, all-round lights show an unbroken arc of ___ degrees

3. Vessels of ___ meters or more _____ _____ decks; less than 100 meters, may light decks.

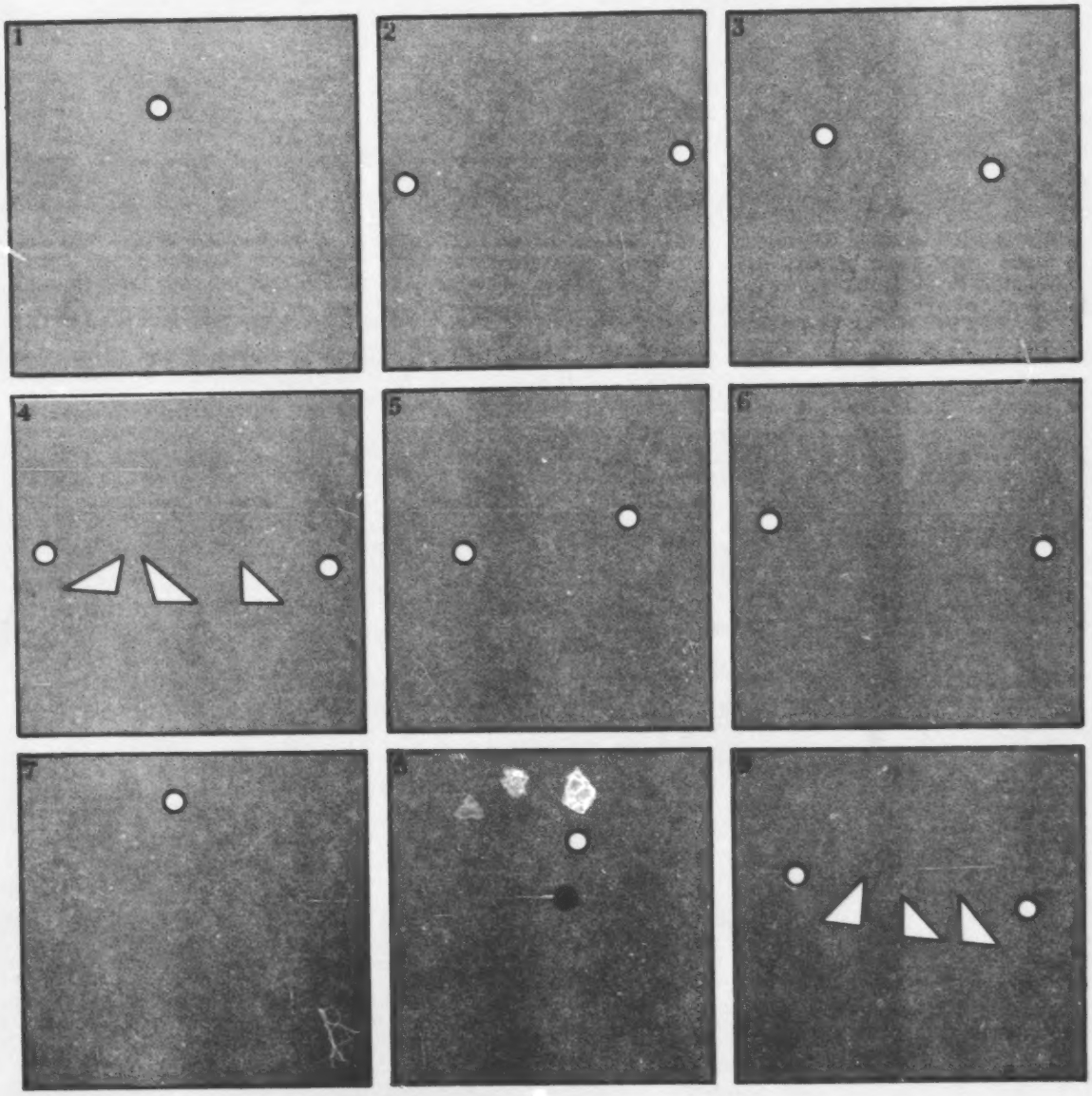
If You See . . .	Then You Know . . .
1. One white light	Vessel may be at anchor, ___ than 50 meters in length. **NOTE:** Single white lights are confusing. They may indicate various things, and should be approached with caution.
2. Two white lights	Vessel at anchor, _____ 50 meters or more in length.
3. One light higher	Vessel's _____ (_____ light indicates bow).

PRACTICE AT ANCHOR

Directions: Mentally describe the following for each vessel below:

1. Is it an example of a light we have covered?
   (If it is not, skip questions 2, 3, & 4)
2. Is it underway?
3. What is its heading?
4. Is it 50 or more meters in length?

Check your description on the next page after each situation, but skip around the page to avoid seeing the answer to the next situation.



99

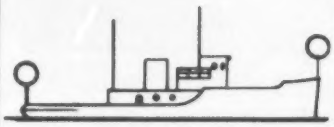
PRACTICE ANSWERS

AT ANCHOR

1

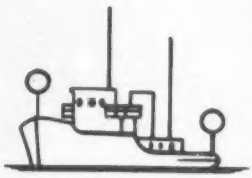
Cannot determine**

2



Anchor lights
Heading right
50 meters or more

3

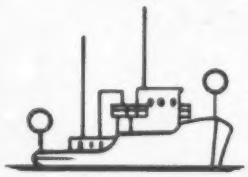


Anchor lights
Heading left
50 meters or more

4

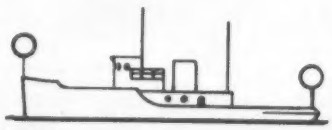
Anchor lights
Heading left
100 meters or more

5



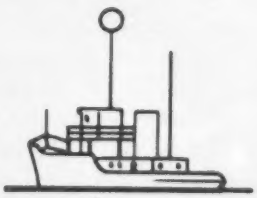
Anchor lights
Heading right
50 meters or more

6



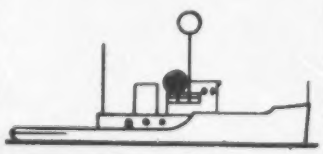
Anchor lights
Heading left
50 meters or more

7



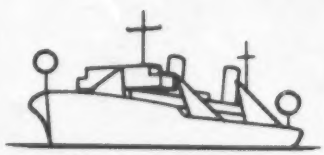
Cannot determine**

8



Non-Example
Underway
Heading right
Less than 50 meters

9



Anchor lights
Heading left
100 meters or more

** NOTE: Single white lights are confusing. They can be: (1) running lights of a vessel headed away from you; (2) anchor light on vessel less than 50 meters; (3) Anchor light on vessel 50 meters or more (second anchor light masked by vessel's superstructure).

All correct? Go to p. 94 .

Missed some?

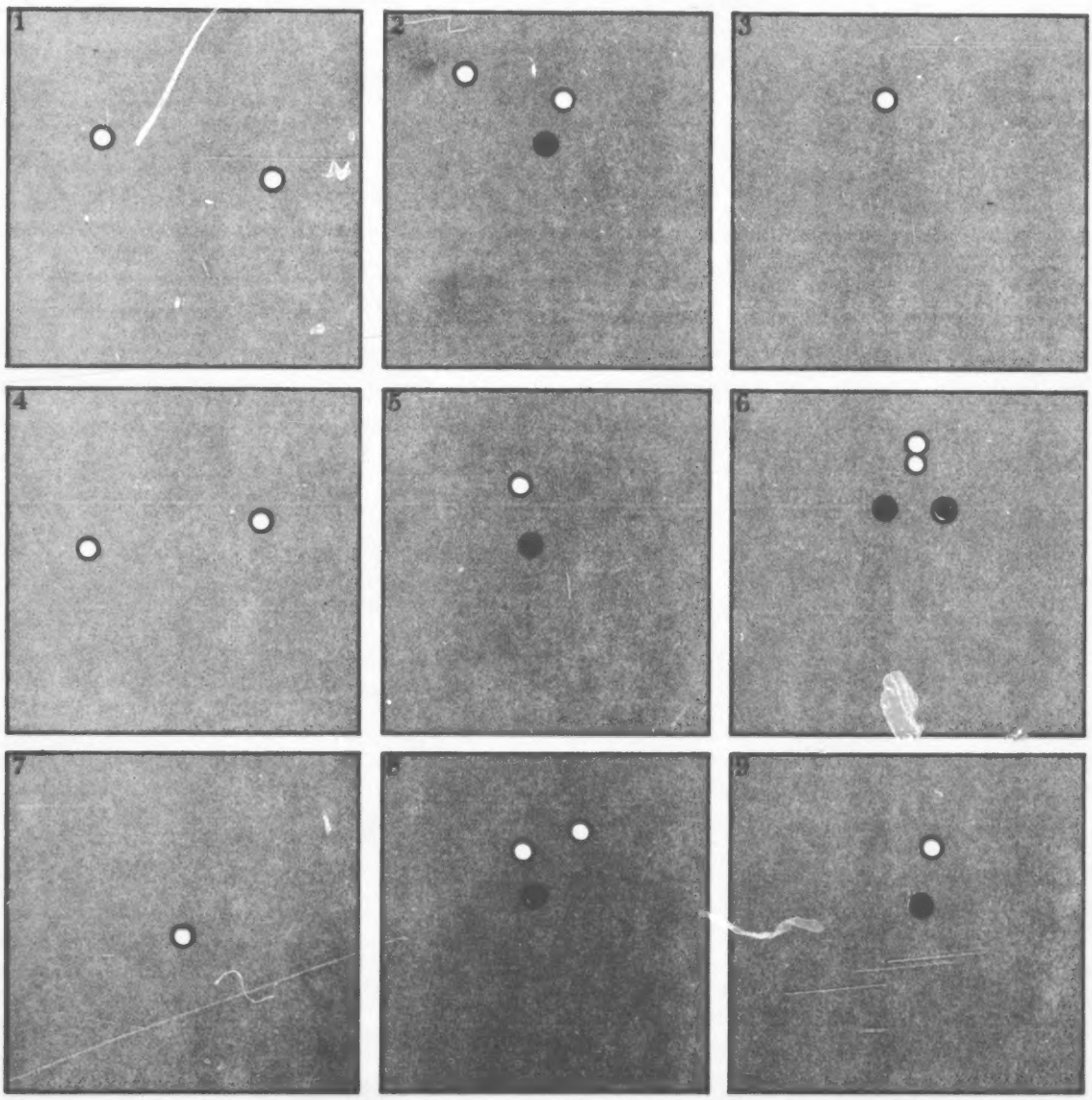
1) Restudy page 90 .

2) Do this exercise again.

PRACTICE YOUR JOB

You are standing watch on the bridge—it is late at night and your ship is approaching a very busy harbor. Tell the OOD the following about each of the vessels you sight below:

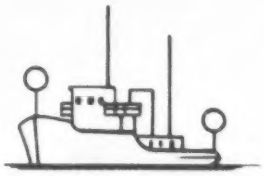
1. What is the vessel's activity?
2. Is it making way?
3. What is its heading?
4. Is it 50 meters or more?



ANSWERS

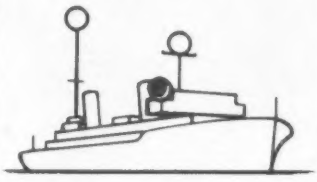
PRACTICE YOUR JOB

1



Anchor lights
Heading left
50 meters or more

2

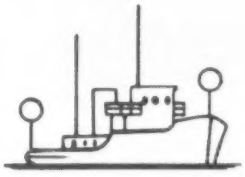


Running lights
Heading right
50 meters or more

3

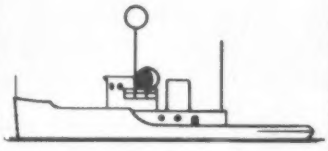
Cannot determine**

4



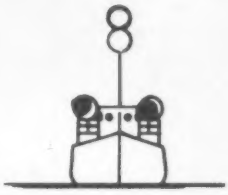
Anchor lights
Heading right
50 meters or more

5



Running lights
Heading left

6

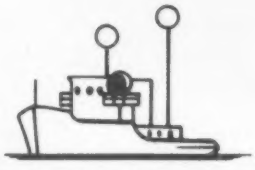


Running lights
Heading toward you
50 meters or more

7

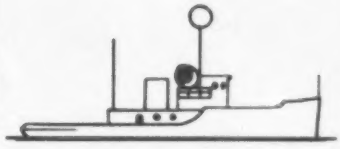
Cannot determine**

8



Running lights
Heading left
50 meters or more

9



Running lights
Heading right
Less than 50 meters

** NOTE: Single white lights are confusing. They can be: (1) Running lights of a vessel headed away from you; (2) Anchor light on vessel less than 50 meters; (3) Anchor light on vessel 50 meters or more (second anchor light masked by vessel's superstructure).

If you missed any answers return to the Cues and practice until you can describe the situations correctly and easily.

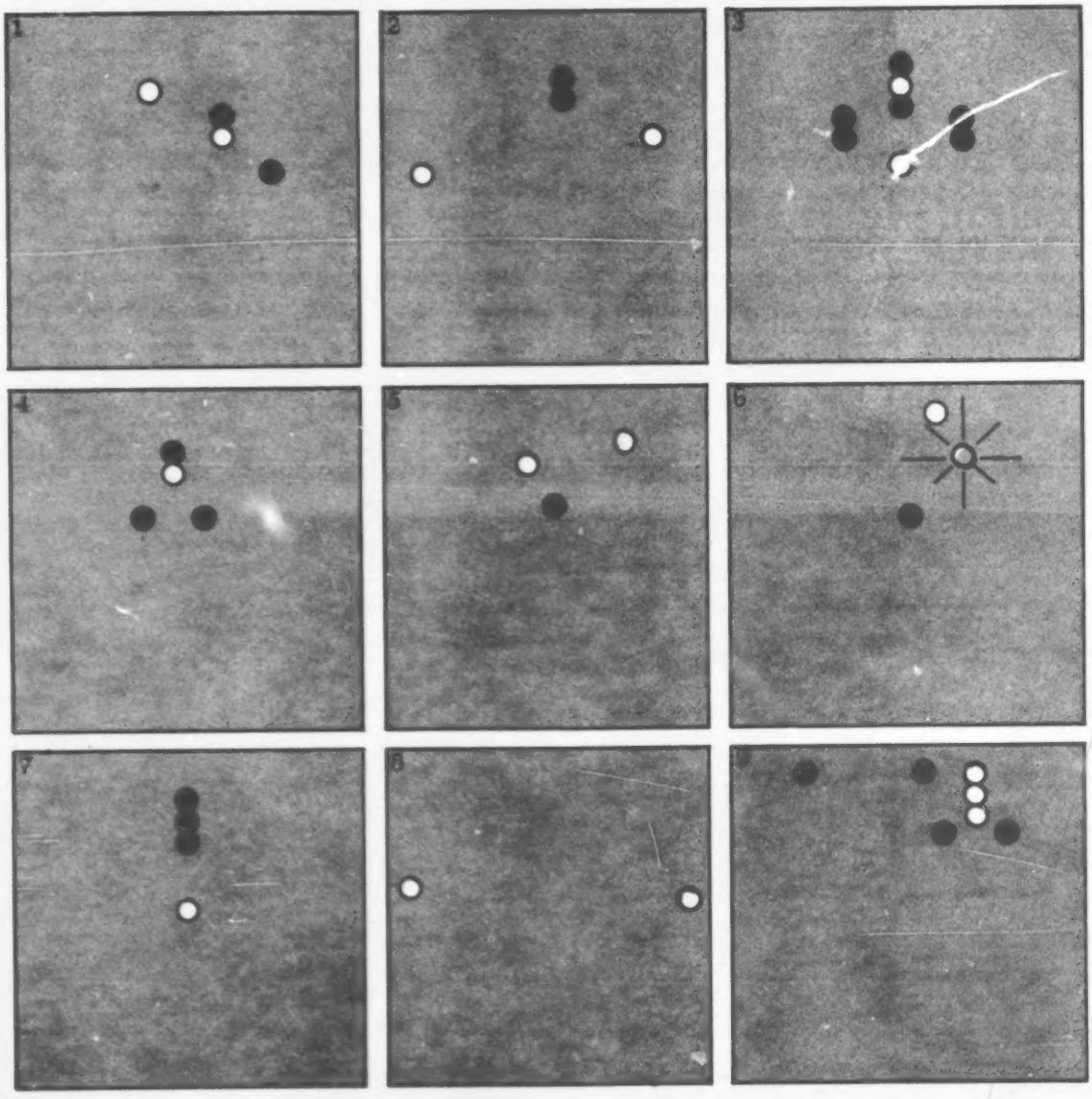
SELF TEST

DIRECTIONS: Use answer sheets provided

(1) In Column #1, mark the vessel's activity.

(2) In Column #2, mark the vessel's heading.

(3) In Column #3, mark whether the vessel is making way or not making way.



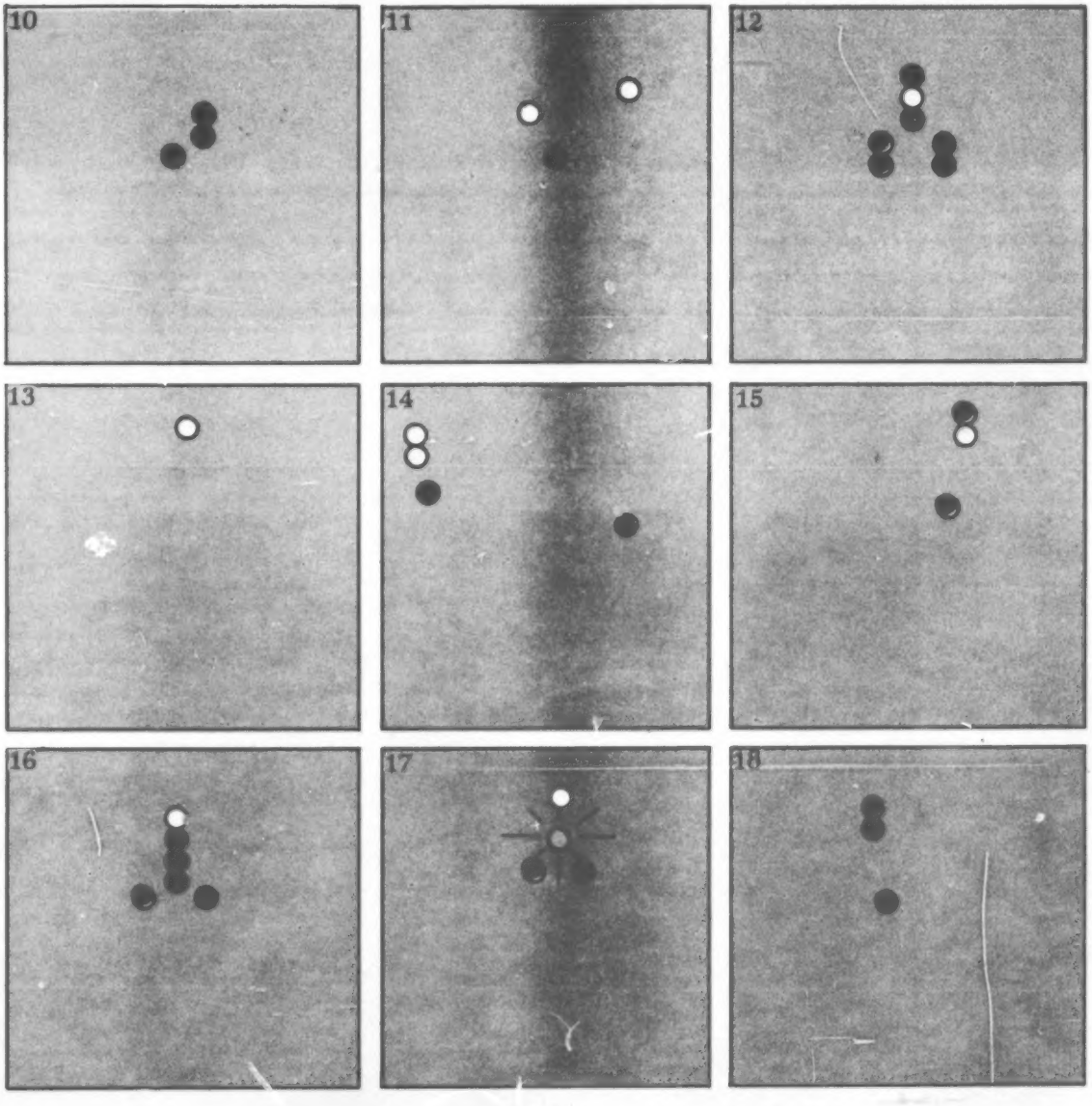
SELF TEST (Continued)

DIRECTIONS: Use answer sheets provided

(1) In Column #1, mark the vessel's activity.

(2) In Column #2, mark the vessel's heading.

(3) In Column #3, mark whether the vessel is making way or not making way.



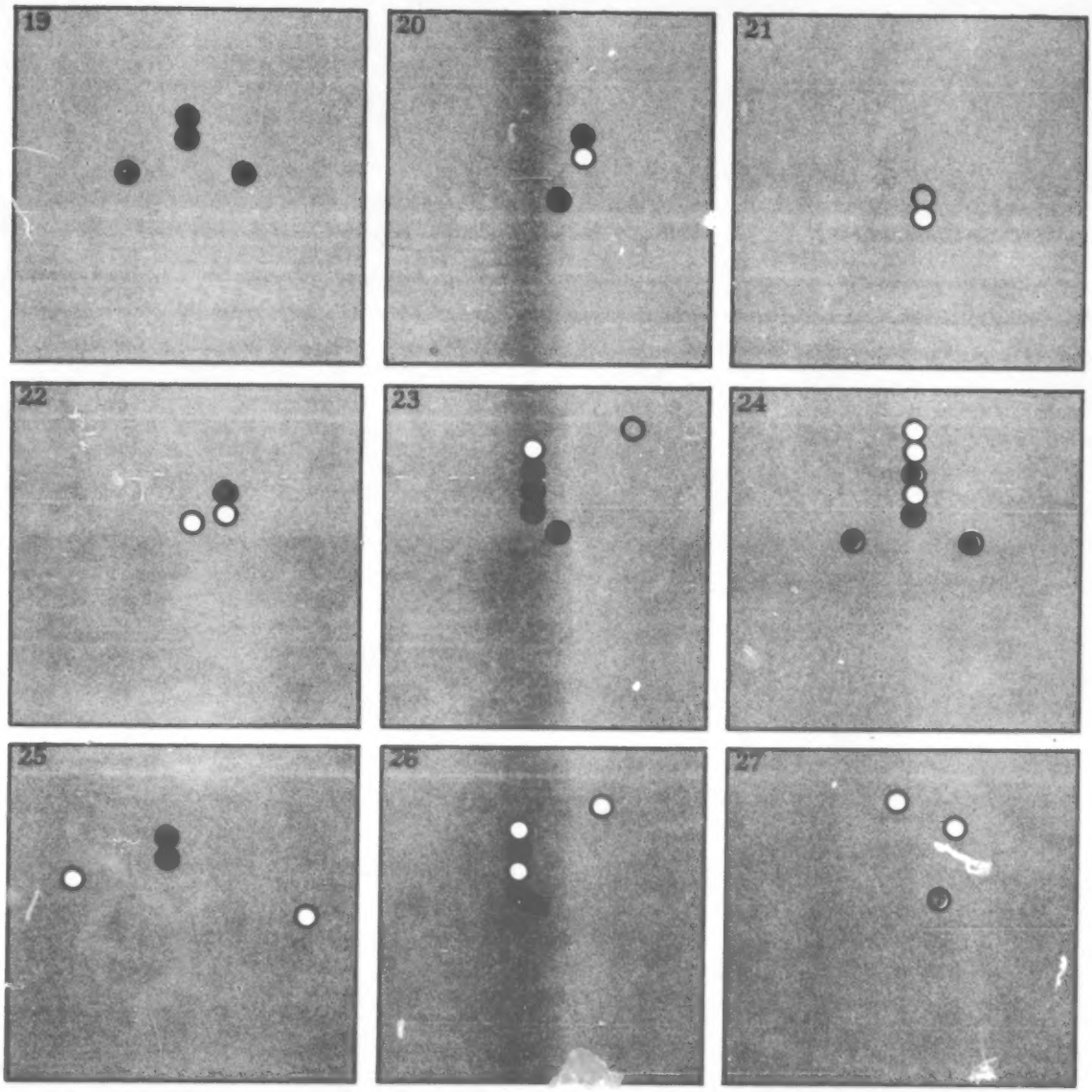
SELF TEST (Continued)

DIRECTIONS: Use answer sheets provided

(1) In Column #1, mark the vessel's activity.

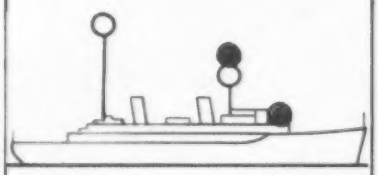
(2) In Column #2, mark the vessel's heading.

(3) In Column #3, mark whether the vessel is making way or not making way.



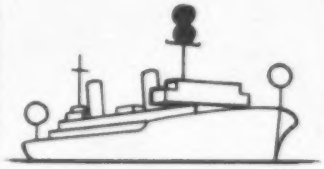
ANSWERS **SELF TEST**

1



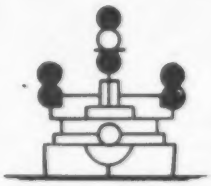
Trawling
Making way
Heading right
50 meters or more

2



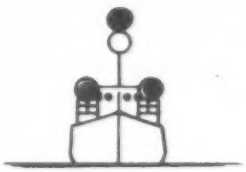
Aground
Not making way
Heading right
50 meters or more

3



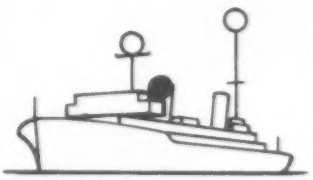
Dredging
Making way
Heading away from you
Obstruction - port

4



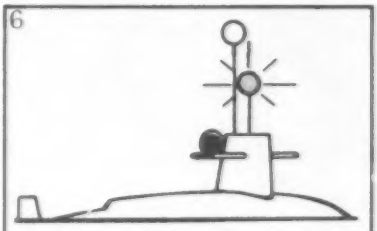
Fishing
Making way
Heading toward you

5



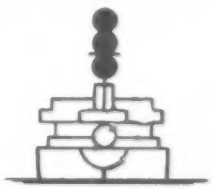
Running lights
Under way
Heading left
50 meters or more

6



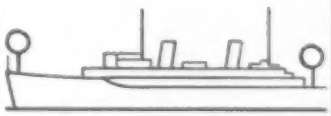
Submarine
Underway
Heading right

7



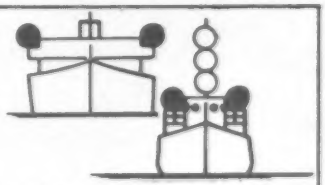
Constrained
Underway
Heading away from you

8



Anchored
Heading left
50 meters or more

9



Towing and towed vessel
Underway
Heading toward you
Tow less than 200 meters
Towing vessel less than
50 meters

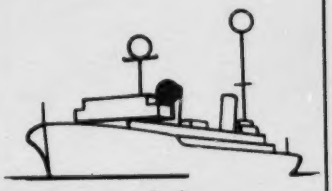
ANSWERS

SELF TEST (Continued)

10

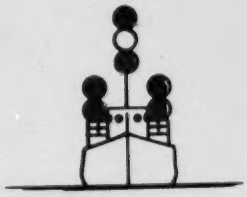
Not under command
Making way
Heading right

11



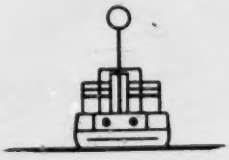
Running lig!..
Underway
Heading right
50 meters or more

12



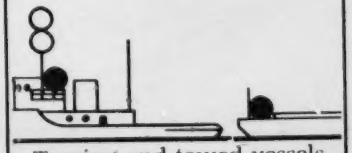
Dredging
Not making way
Heading (?)
Obstruction (?)

13



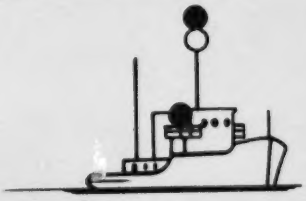
Anchored (?)
Single white light may
mean several things

14



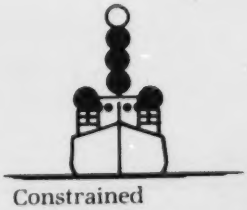
Towing and towed vessels
Underway
Heading left
Towing vessel less than
50 meters
Tow less than 200 meters

15



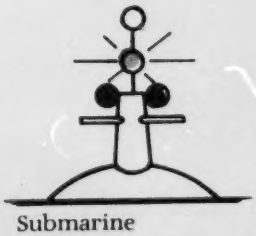
Trawling
Making way
Heading right
Less than 50 meters

16



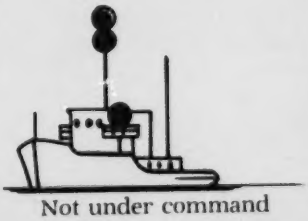
Constrained
Underway
Heading toward you
Less than 50 meters

17



Submarine
Underway
Heading toward you
Less than 50 meters

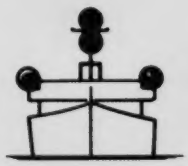
18



Not under command
Making way
Heading left

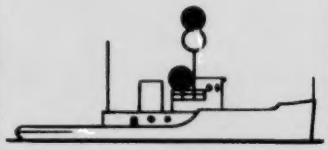
ANSWERS **SELF TEST (Continued)**

19



Not under command
Making way
Heading toward you

20

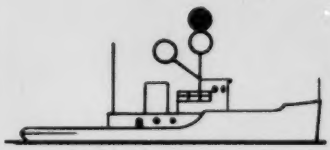


Trawling
Making way
Heading right

21

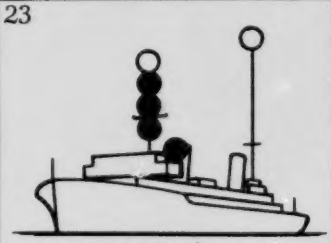
Towing
Underway
Heading away from you

22



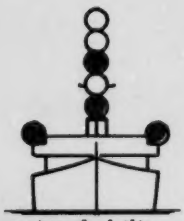
Fishing
Not making way
Heading (?)
Gear extended (?)

23



Constrained
Underway
Heading left
50 meters or more

24

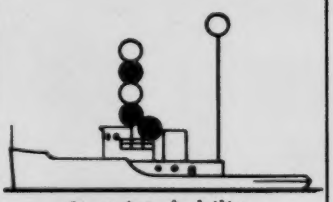


Restricted ability
Making way
Heading toward you
50 meters or more

25

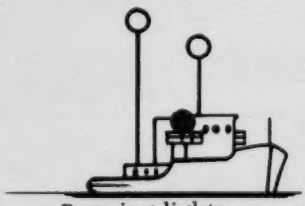
Aground
Heading left
50 meters or more

26



Restricted ability
Making way
Heading left
50 meters or more

27



Running lights
Underway
Heading right
50 meters or more

98

SECTION VII

RECOGNIZING AND DRAWING SYMBOLS

DESCRIPTION OF TASK CATEGORY

This task category is concerned with identifying and naming graphic symbols, such as those used on engineering drawings and weather charts as well as insignia used by the military services. It also concerns writing the proper symbol, given the name or meaning of the symbol. Use of the format models is suggested only for nontrivial learning tasks where many symbols are imbedded in large interrelated sets which are meaningful in specific job contexts. Identification rather than interpretation is emphasized.

Five examples of learning objectives which illustrate these systems of symbols are provided below.

1. Given the 100 symbolic numbers for special types of Present Weather, DRAW their graphic symbol.

2. Given a sheet containing various electronic symbols and schematic diagrams, CIRCLE those representing integrated circuits and simplified schematics to a criterion of 80 percent accuracy.

3. Given a color illustration of navigation buoys, LABEL each by name.

4. Given a simplified schematic diagram, LABEL the Triac symbols.

5. Given a list of line markings from MIL-STD-1247, and a list of lines (i.e., fuel, oil, hydraulic), MATCH the line to its appropriate markings.

LEARNING STRATEGY

A list of relevant symbols is created together with the meaning associated with each symbol. The list is divided into subsets if it is long and the material is complex. Within any given list or subset, the most difficult symbols are presented first or last, where the likelihood of recall is greater.

Mnemonics such as imagery, rhymes, acronyms, acrostics, and stories are invented to associate the symbol with its meaning. Mnemonics which cause an emotional reaction are especially helpful.

Practice drills are provided enabling the rehearsal of associations. The first exercises present small manageable sets of symbols with appropriate feedback to ensure efficient learning. As training continues, the symbols are repeated in exercises, and the number of symbols in an exercise is increased. The goal is to achieve the recognition and naming of all the symbols in the objective accurately and quickly. Within these drills, symbols are presented in random order so that symbol position in a set is not used as a prompt for recall. Exercises should be distributed over time if the

material is difficult to learn. When both symbol recognition and symbol drawing must be learned, separate exercises for each should be created.

FORMAT MODEL

The format model for recognizing and drawing symbols demonstrates the symbol learning strategy. There are two pages in this format model. Page 1 of the model presents a set of symbols with meanings and associated memory aids. It also presents an exercise for practicing the recall of the symbols and their meanings. Page 2 of the model presents a longer exercise made up of the symbols contained in the shorter type of exercises. The symbols used in the format model are the badges for U.S. Navy Aviation ratings.

Following the format model, two examples are provided to show how the model can be used to design materials. The first example is the complete instructional module on the recognition of U.S. Navy Aviation rating badges. The second example is an introductory exercise in coding and decoding Morse code.

FORMAT MODEL
RECOGNIZING AND DRAWING SYMBOLS

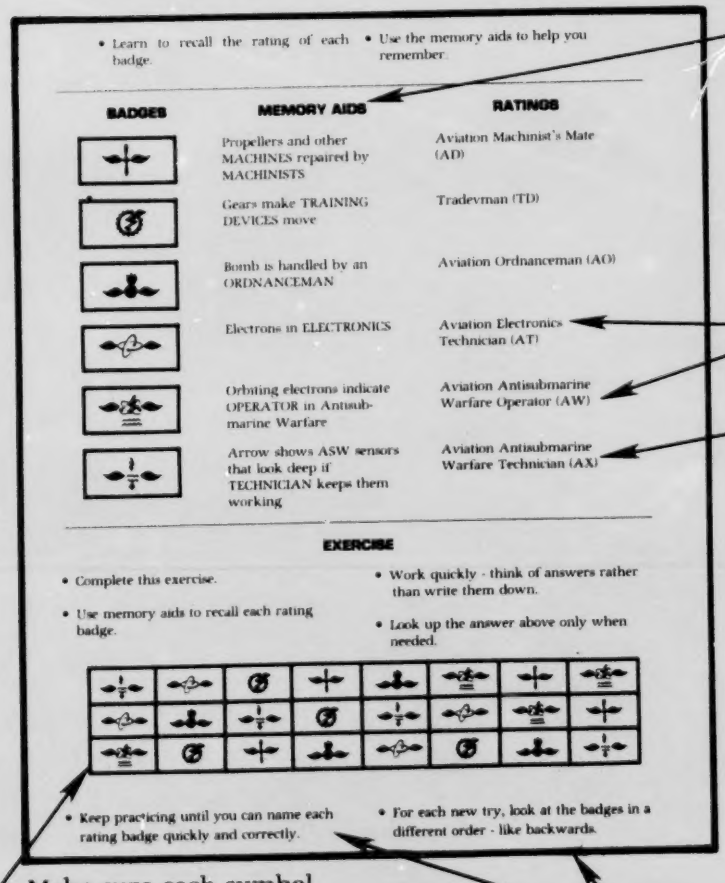
A general format for use in designing training materials presenting symbols that must be recognized and their names recalled.

Recognizing and Drawing Symbols Format Model - Page 1

Use this page format for each group of 4 to 7 symbols.

The purpose of this page format is to present:
- symbols and meanings.
- memory aids.
- directions for study.
- practice exercises.

Use TAEG Report #60, *Use of Mnemonics in Training Materials: A Guide for Technical Writers*, for help in creating memory aids.


• Learn to recall the rating of each badge.
• Use the memory aids to help you remember.
BADGES
MEMORY AIDS
RATINGS
Propellers and other MACHINES repaired by MACHINISTS
Aviation Machinist's Mate (AD)
Gears make TRAINING DEVICES move
Tradevman (TD)
Bomb is handled by an ORDNANCEMAN
Aviation Ordnanceman (AO)
Electrons in ELECTRONICS
Aviation Electronics Technician (AT)
Orbiting electrons indicate OPERATOR in Antisubmarine Warfare
Aviation Antisubmarine Warfare Operator (AW)
Arrow shows ASW sensors that look deep if TECHNICIAN keeps them working
Aviation Antisubmarine Warfare Technician (AX)
EXERCISE
• Complete this exercise.
• Use memory aids to recall each rating badge.
• Work quickly - think of answers rather than write them down.
• Look up the answer above only when needed.
• Keep practicing until you can name each rating badge quickly and correctly.
• For each new try, look at the badges in a different order - like backwards.

Modify directions for your type of symbol.

Select 4 to 7 symbols for this page. If you have more symbols, make additional pages.

Place similar symbols next to each other.

Place most difficult to remember symbols in the top or bottom position in list.

Make sure each symbol appears at least three times

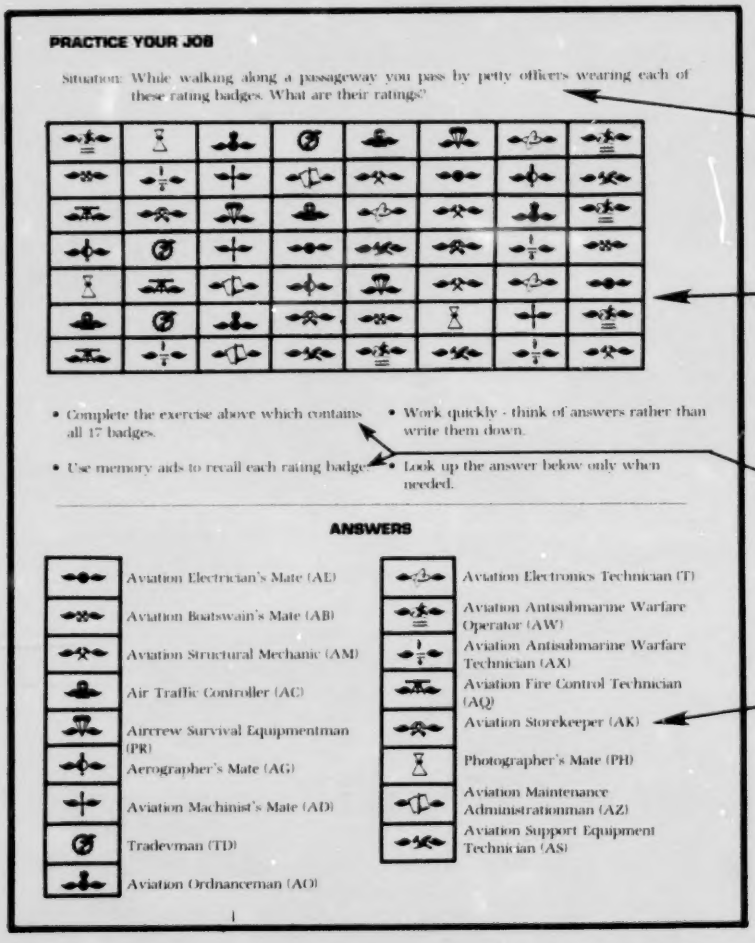
Directions should mention practice and change of order.

Recognizing and Drawing Symbols Format Model - Page 2

Use this page format for large exercises that combine the symbols from 3 smaller exercises based on page 1 of symbol format.

The purpose of this page format is to provide:
- directions for practice.
- repeated practice.
- presentation of answers.

Select about 20 symbols for this large exercise. Make sure some symbols from each of the preceding small exercises are included on this page. If you have more than 20 symbols, make additional pages.


PRACTICE YOUR JOB
Situation: While walking along a passageway you pass by petty officers wearing each of these rating badges. What are their ratings?
• Complete the exercise above which contains all 17 badges.
• Use memory aids to recall each rating badge.
• Work quickly - think of answers rather than write them down.
• Look up the answer below only when needed.
ANSWERS
Aviation Electrician's Mate (AE)
Aviation Boatswain's Mate (AB)
Aviation Structural Mechanic (AM)
Air Traffic Controller (AC)
Aircrew Survival Equipmentman (PR)
Aerographer's Mate (AG)
Aviation Machinist's Mate (AD)
Tradevman (TD)
Aviation Ordnanceman (AO)
Aviation Electronics Technician (T)
Aviation Antisubmarine Warfare Operator (AW)
Aviation Antisubmarine Warfare Technician (AX)
Aviation Fire Control Technician (AQ)
Aviation Storekeeper (AK)
Photographer's Mate (PH)
Aviation Maintenance Administrationman (AZ)
Aviation Support Equipment Technician (AS)

Create a job-related scenario that calls for remembering the symbols.

Make sure each symbol appears at least three times.

Modify directions for your type of symbol.

Present answers in a logical order, if there is one.

EXAMPLE 1: U.S. NAVY AVIATION RATING SYMBOLS

Learning Objective: Given the insignia for all U.S. Navy Aviation ratings, verbally STATE the proper name for each of the ratings.

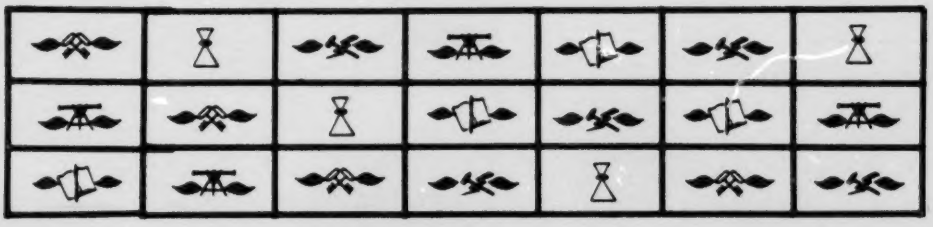
There are 17 Aviation ratings. The example to follow is a complete module which presents three sets of five to six ratings with accompanying exercises. All 17 ratings are presented at the same time on the composite exercise page.

- Learn to recall the rating of each badge.
- Use the memory aids to help you remember.

BADGES	MEMORY AIDS	RATINGS
	Guns aimed - ready to FIRE	Aviation Fire Control Technician (AQ)
	Keys to the STORE	Aviation Storekeeper (AK)
	Light through the PHOTOGRAPHIC lens	Photographer's Mate (PH)
	ADMINISTRATION requires MAINTENANCE records	Aviation Maintenance Administrationman (AZ)
	Use hammer to repair SUPPORT EQUIPMENT	Aviation Support Equipment Technician (AS)

EXERCISE

- Complete this exercise.
- Work quickly - think of answers rather than write them down.
- Use memory aids to recall each rating badge.
- Look up the answer above only when needed.



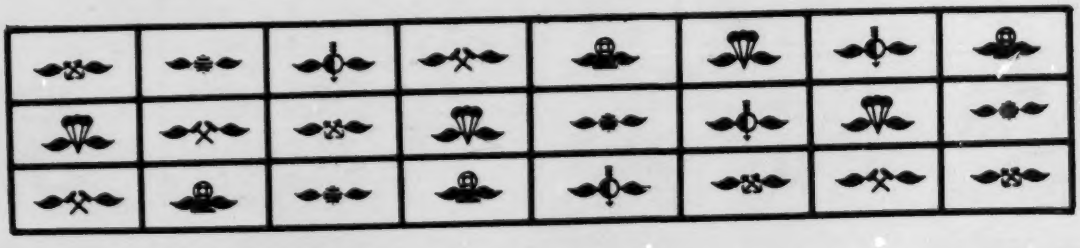
- Keep practicing until you can name each rating badge quickly and correctly.
- For each new try, look at the badges in a different order - like backwards.

- Learn to recall the rating of each badge.
- Use the memory aids to help you remember.

BADGES	MEMORY AIDS	RATINGS
	The world is criss-crossed with ELECTRIC power lines	Aviation Electrician's Mate (AE)
	Anchors are on boats	Aviation Boatswain's Mate (AB)
	Two hammers use by MECHANICS	Aviation Structural MECHANIC (AM)
	Microphone of an AIR TRAFFIC CONTROLLER	Air Traffic Controller (AC)
	Parachutes are AIRCREW SURVIVAL EQUIPMENT	Aircrew Survival Equip-mentman (PR)
	Weather symbols are plotted by AEROGRAPHER'S MATE	Aerographer's Mate (AG)

EXERCISE

- Complete this exercise.
- Work quickly - think of answers rather than write them down.
- Use memory aids to recall each rating badge.
- Look up the answer above only when needed.



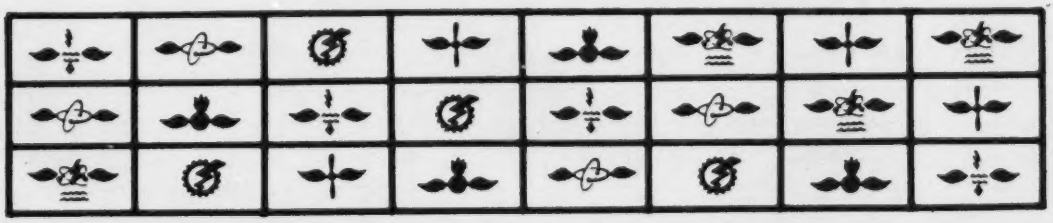
- Keep practicing until you can name each rating badge quickly and correctly.
- For each new try, look at the badges in a different order - like backwards.

- Learn to recall the rating of each badge.
- Use the memory aids to help you remember.

BADGES	MEMORY AIDS	RATINGS
	Propellers and other MACHINES repaired by MACHINISTS	Aviation Machinist's Mate (AD)
	Gears make TRAINING DEVICES move	Tradevman (TD)
	Bomb is handled by an ORDNANCEMAN	Aviation Ordnanceman (AO)
	Electrons in ELECTRONICS	Aviation Electronics Technician (AT)
	Orbiting electrons indicate OPERATOR in Antisubmarine Warfare	Aviation Antisubmarine Warfare Operator (AW)
	Arrow shows ASW sensors that look deep if TECHNICIAN keeps them working	Aviation Antisubmarine Warfare Technician (AX)

EXERCISE

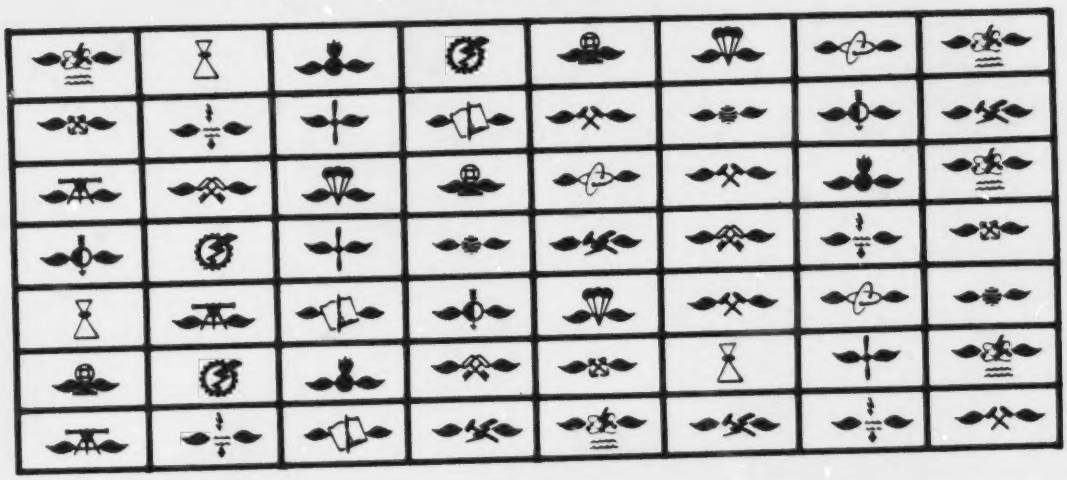
- Complete this exercise.
- Use memory aids to recall each rating badge.
- Work quickly - think of answers rather than write them down.
- Look up the answer above only when needed.



- Keep practicing until you can name each rating badge quickly and correctly.
- For each new try, look at the badges in a different order - like backwards.

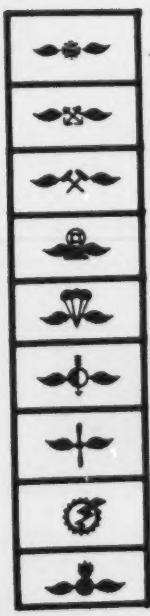
PRACTICE YOUR JOB

Situation: While walking along a passageway you pass by petty officers wearing each of these rating badges. What are their ratings?



- Complete the exercise above which contains all 17 badges.
- Use memory aids to recall each rating badge.
- Work quickly - think of answers rather than write them down.
- Look up the answer below only when needed.

ANSWERS



Aviation Electrician's Mate (AE)

Aviation Boatswain's Mate (AB)

Aviation Structural Mechanic (AM)

Air Traffic Controller (AC)

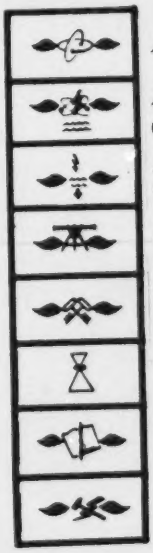
Aircrew Survival Equipmentman (PR)

Aerographer's Mate (AG)

Aviation Machinist's Mate (AD)

Tradevman (TD)

Aviation Ordnanceman (AO)



Aviation Electronics Technician (AT)

Aviation Antisubmarine Warfare Operator (AW)

Aviation Antisubmarine Warfare Technician (AX)

Aviation Fire Control Technician (AQ)

Aviation Storekeeper (AK)

Photographer's Mate (PH)

Aviation Maintenance Administrationman (AZ)

Aviation Support Equipment Technician (AS)

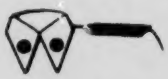
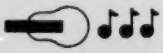
EXAMPLE 2: INTERNATIONAL MORSE CODE SYMBOLS

Learning Objectives: Given random letters, numbers, and punctuation marks, WRITE the Morse code equivalents; and given printed Morse code symbols, WRITE the meaning of each.

There are 43 symbols in Morse code. They can be divided into seven sets with six to seven symbols in each set. The example presents two of the sets of symbols for initial exercises and then the symbols are combined on a composite exercise page. These pages adequately demonstrate the use of the format model. The remaining five sets of symbols are constructed in the same manner.

Note how the exercises give practice in both sending and receiving Morse code.

- Learn to recall the definition of each symbol.
- Use the memory aids to help you remember.

DEFINITION	MEMORY AID	SYMBOL
U	UNIFORM insignia 	• • –
V	VICTOR in boxing	• • • –
N	NOVEMBER turkey	– •
D	DELTA jet and 2 clouds	– • •
B	BRAVO! Play 3 notes again! 	– • • •
J	JULIETT	• – – –

EXERCISE

- Complete these exercises
- Use memory aids to
  - recall each symbol
  - recall each notation
- Work quickly—think of answers rather than write them down.
- Look up the answers only when needed.

U	V	N	J	B	V
J	V	D	V	N	V
N	D	B	J	B	D

– •	• – – –	– • • •	– • •	– •	– • •
• • –	– • •	• • • –	– • • •	• • –	• – – –
• • • –	– • • •	• – – –	– •	• • • –	• • –

- Keep practicing until you can name each symbol and letter quickly and correctly.
- For each new try, look at the letters or symbols in a different order—like backwards.

- Learn to recall the definition of each symbol.
- Use the memory aids to help you remember.

DEFINITION	MEMORY AID	SYMBOL
,	MIM Note: M I M --..--	--..--
-	DU Note: D U -.. ..-	-....-
(	KN Note: K N -.--.	-.--.
)	KK Note: K K -.--.-	-.--.-
.	AAA Note: A A A .-.-.-	.-.-.-
/	XE Note: X E -..- .	-..-.
?	IMI Note: I M I ..--..	..--..

EXERCISE

- Complete these exercises
- Use memory aids to
  - recall each symbol
  - recall each letter
- Work quickly—think of answers rather than write them down
- Look up the answers only when needed

-	.	,	/	(	?	)
,	-	.	)	/	(	?
?	,	/	.	)	-	(

-...-	--..--	.-.-.-	..--..	-.--.-	-....-	-.--.
..--..	-.--.-	-.--.	-....-	-..-.	--...--	.-.-.-
-....-	.-.-.-	-...-	-.--.-	-.--.	..--..	--..--

PRACTICE YOUR JOB

This exercise is part of the training for jobs that require you to both read and send messages in Morse Code.

)	U	J	-	D	(	V	N	B	,
—•	-••••-	—••	••--••	--•---	•----	-•--•	•••—	-••-•	••—
/	?	)	V	B	••-	N	U	-•••	(
-•--•-	-•••	•-•-•-	-••	•••-	-•	•---	-•--•	--•---	-••••-
?	,	/	•---	•• -	D	B	V	N	(
••—••	-•••	•-•-•-	••-	-•--•-	-••-•	•-•-•-	-•--•	-••	--•---
D	-•••	J	,	U	/	?	••-	)	N
-•--•-	-•	-•••-	-•••	•••-	•----	••-	-••-•	••--••	-•--•

- Complete the exercise above which contains all 13 symbols.
- Use memory aids to
  - recall each symbol
  - recall each letter (notation).
- Work quickly - think of answers rather than write them down.
- Look up the answer below only when needed.

ANSWERS

U	••-
V	•••-
N	-•
D	-••

B	-•••
J	•---
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SECTION VIII

OPERATIONAL EVIDENCE OF THE UTILITY OF THE FORMAT MODELS

This handbook provides models for technical writers useful in formatting technical information for training. Many of the elements of the handbook have already been tested. Instructional materials based on the models have undergone field trials, and school personnel have used the models to create materials. The success of these endeavors suggest that these models are of value in creating instructional material for military training. Recent specific uses of the models in field settings are described below.

USE OF THE MODELS BY AUTHORS IN THE FIELD

The first field activity to use the models in designing instructional materials was the Technology Training Division of the Consolidated Navy Electronic Warfare School at Corry Station, Pensacola, Florida. Two models, Recalling Facts About Equipment and Performing Procedures, were used to prepare job sheets supporting the AN/USM-425(V)1 oscilloscope training (Rotzer and Tornow, 1982). Excerpts from the job sheets are presented in the appendix. Results from student evaluation questionnaires indicate that the materials have been well accepted. However, formal comparisons between the formatted materials and the former method of instruction have not been undertaken.

Another learning aid, based on the Performing Procedures format model, recently has been authored by a subject matter expert in the Helicopter Antisubmarine Squadron One in Jacksonville, Florida (Pulos, undated). The materials, some of which were presented in section III of this report, are used to teach the procedure for establishing initial control settings for the AQS-13E Sonar in the SH-3H aircraft. Both students and instructors have expressed great satisfaction with the materials. Terrell (1982) cites this as well as some time savings:

> Instructors report that prior to use of the training aid, beginning students required 20 minutes to perform the control setting checklist for the first time. With use of the training aid the same procedure is performed for the first time in less than one minute. Student reactions include favorable comments regarding the use of visual information in the training aid. They also remarked that the opportunity to practice the checklist on the paper mockup gave them a lot of confidence in their ability to perform the procedure on the first trial in the helicopter (p. 23).

FIELD TESTS OF MATERIALS

Preliminary versions of format models have been formally compared to traditional methods of instruction in four classroom situations. In these various field tests described below, materials were constructed by TAEG members with the assistance of subject matter experts.

RECOGNIZING AND DRAWING SYMBOLS. An evaluation of an expanded version of the symbol learning format model, described in Ainsworth (1979), was conducted at the Signalman "A" School at the Naval Training Center, Orlando, Florida. The set of symbols selected for the study was the International Morse code. Learning aids constructed according to three symbol learning format models were compared with traditional narrative materials. The use of the symbol learning strategy incorporating both drill and practice and mnemonics created the greatest enhancement in the performance of students. The most significant gains were made by students of average aptitude. The learning aids virtually eliminated performance differences resulting from variations in aptitude level after 4 hours of practice. The basic operations used in this format were condensed and incorporated into the symbol learning format presented in this handbook.

PERFORMING PROCEDURES. An evaluation of a preliminary version of the Performing Procedures format model, described in Polino and Braby (1980), was conducted using students who were undergoing or had just completed training in the Basic Electricity and Electronics (BE&E) course at the Naval Training Center, Orlando, Florida. The procedure involved calibrating the probe of a Tektronix 545B oscilloscope. This included sequences for initiating power and obtaining a waveform and for probe adjustments to obtain the waveform shape for correct calibration. The procedure format was superior to the traditional narrative and graphics job aid formats tested when the goal was to have students accurately perform the procedure from memory. Superior learning was still evident after a 1-week retention interval. The method also required less hands-on equipment time than traditional methods to accomplish this type of training task.

The most recent evaluation of the Performing Procedures format, described in Scott, McDaniel, and Braby (1982), was conducted at the Helicopter Antisubmarine Squadron One (HS-1) in Jacksonville, Florida. Student pilots were required to learn cockpit procedures prior to practicing them in the cockpit procedures trainer (Device 2C44). A procedures training aid for the SH-3D/H Normal Start Checklist (Braby and Scott, 1982) was constructed using formats similar to the Procedure format model. This training aid was compared with the traditional materials used by HS-1 for this task and the result was superior performance by students using the training aid. These students required fewer trials to attain acceptable levels of proficiency in the cockpit procedure trainer. Fifty-three percent of the students were certified as proficient after their first check in the trainer (as compared to 12.5 percent for those using the traditional materials). Variability in performance among students was significantly reduced.

OTHER FORMATS. In addition to the above, the remaining three format models described in the present report are currently being field tested in the Quartermaster School in Orlando, Florida. Learning aids have been constructed to teach Rules of the Road for the lighting of vessels in international waters. The package is divided into three modules. The first teaches the system of lights and their names according to the Recalling Facts About Equipment format model; the second teaches rules for lighting according to the Applying Rules and Regulations model; and the third teaches how to identify characteristics of vessels at night by their lights according to the Classifying Objects and

Signals model. This instructional package was informally tested prior to the field test. In this preliminary tryout, low aptitude students, who had been set back in the QM school due to academic failure, learned the material to an acceptable criterion after one time through the modules. The more detailed field test currently underway will compare the formatted material to two kinds of self-paced programmed instruction in order to determine their relative instructional effectiveness.

All field test evidence to date demonstrates conclusively that the format models promote superior student performance when used as advertised. The resulting materials are also well accepted by the user.

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Polino, A. M. and Braby, R. Learning of Procedures in Navy Technical Training: An Evaluation of Strategies and Formats. TAEG Report No. 84. 1980. Training Analysis and Evaluation Group, Orlando, FL 32813 (AD A084067).

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Rotzer, R. and Tornow, P. Job Sheet for the AN/USM-425(V)1 Oscilloscope. Technology Training Division, Consolidated Navy Electronic Warfare School, Navy Technical Training Center, Corry Station, Pensacola, FL 32509.

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Scott, P. G., McDaniel, W. C., and Braby, R. Improved Procedures Training Through Use of Aids Developed from Learning Guidelines. TAEG Report No. 113, 1982. Training Analysis and Evaluation Group, Orlando, FL 32813 (AD A113109).

Terrell, B. A Guide for Preparing Procedure Training Aids. TAEG Technical Memorandum No. 82-2. 1982. Training Analysis and Evaluation Group, Orlando, FL 32813 (AD A114406).

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APPENDIX

CORRY STATION MATERIAL BASED ON TWO FORMAT MODELS

SYSTEM DESCRIPTION AND PROCEDURES FOR THE AN/USM-425(V)1 OSCILLOSCOPE

The following example comes from the Navy Technical Training Center at Corry Station in Pensacola, Florida. The job sheets were designed by Mr. Ralph Rotzer and CTM2 Pamela Tornow, at the Technology Training Division of the Consolidated Navy Electronic Warfare School. They used two models, Recalling Facts About a System and Performing Procedures, to prepare job sheets supporting the AN/USM-425(V)1 oscilloscope.

The training aids familiarize the EW students with the names and purposes of the front panel controls and teach them the procedures for measuring amplitude and period time and for doing a dual-trace operation.

Two excerpts from the EW instructional package are presented--one from Section A, System Description and Nomenclature, and one from Section B, Procedures. The example shows how the authors followed two format models but took the liberty of changing the formats where appropriate. The final result is an adaptation of the format models to their particular job task.

Technical Report 129

JOB SHEETS

AN/USM-425(V)1 OSCILLOSCOPE

Prepared by

Mr. Ralph Rotzer
and
CTM2 Pamela Tornow

Technology Training Division
Navy Technical Training Center
Corry Station, Pensacola, Florida

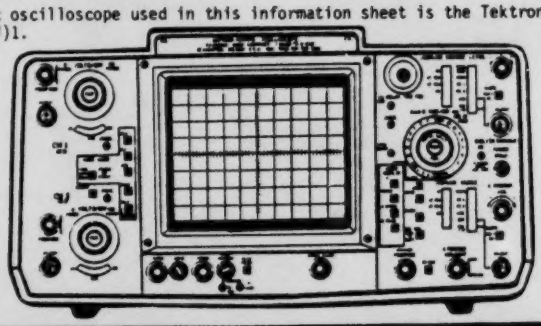
September 1981

Section A
SYSTEM DESCRIPTION
and
NOMENCLATURE

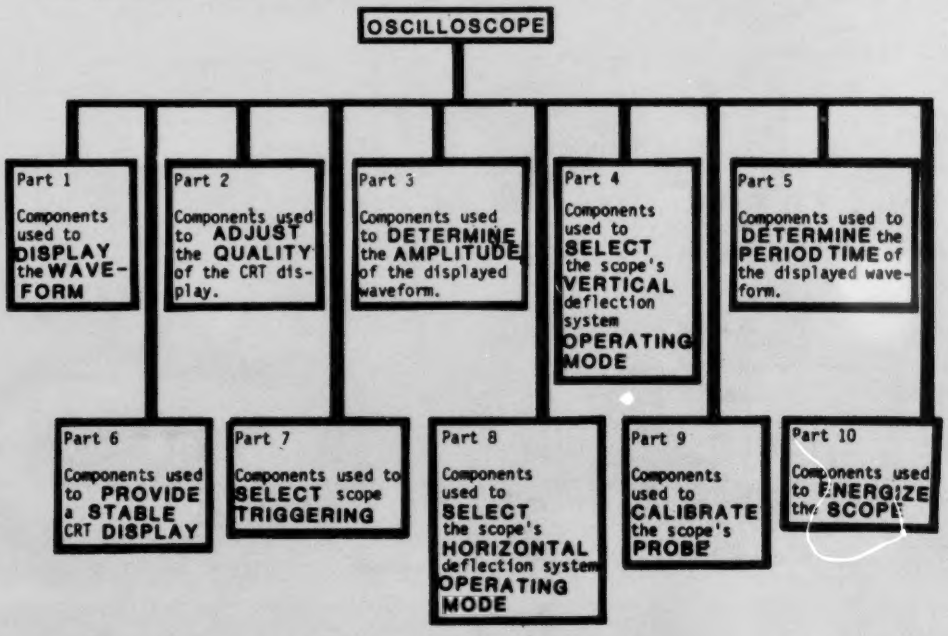
INTRODUCTION

The oscilloscope is a very versatile piece of test equipment. It provides you with a graphic display of voltage waveforms. As a technician you will use this instrument to analyze waveform characteristics such as amplitude, shape, phase relationships between two waveforms, and period time. You will use the o'scope when troubleshooting to trace signals through circuits. You will also use the scope when performing alignment procedures to observe the effect a circuit adjustment has on the associated waveform.

The specific oscilloscope used in this information sheet is the Tektronix model AN/USM-425(V)1.

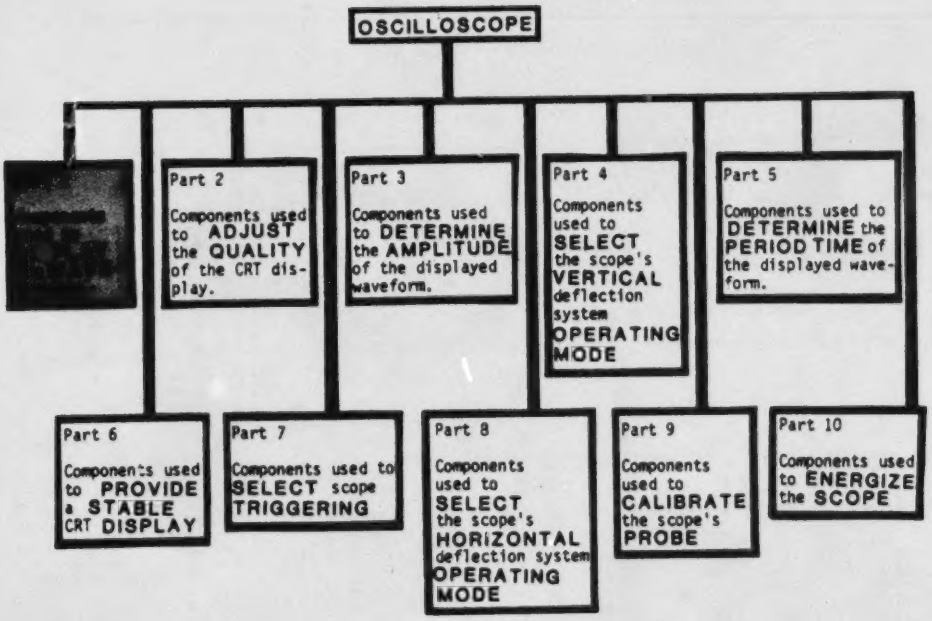


This section of the information sheet presents the names of the oscilloscope components that are used to provide a basic waveform display. The functions of the fundamental controls are also discussed.


OSCILLOSCOPE
Part 1
Components used to DISPLAY the WAVE-FORM
Part 2
Components used to ADJUST the QUALITY of the CRT display.
Part 3
Components used to DETERMINE the AMPLITUDE of the displayed waveform.
Part 4
Components used to SELECT the scope's VERTICAL deflection system OPERATING MODE
Part 5
Components used to DETERMINE the PERIOD TIME of the displayed waveform.
Part 6
Components used to PROVIDE a STABLE CRT DISPLAY
Part 7
Components used to SELECT scope TRIGGERING
Part 8
Components used to SELECT the scope's HORIZONTAL deflection system OPERATING MODE
Part 9
Components used to CALIBRATE the scope's PROBE
Part 10
Components used to ENERGIZE the SCOPE

GENERALITY HELPS

NOTE: The below diagram lets you see where you are in your study of the fundamental components of the scope.

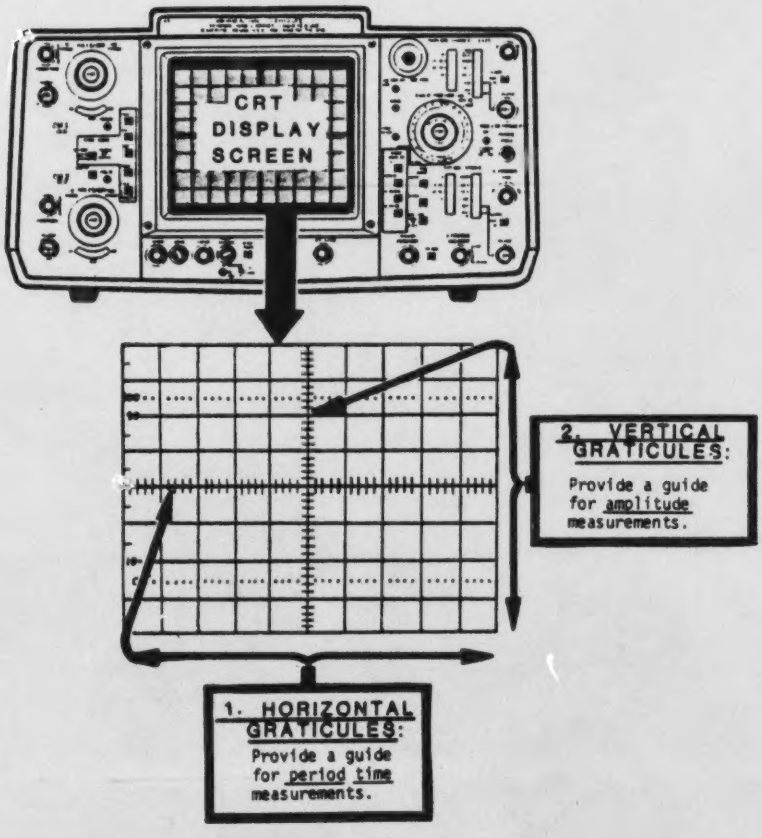

OSCILLOSCOPE
Part 2
Components used to ADJUST the QUALITY of the CRT display.
Part 3
Components used to DETERMINE the AMPLITUDE of the displayed waveform.
Part 4
Components used to SELECT the scope's VERTICAL deflection system OPERATING MODE
Part 5
Components used to DETERMINE the PERIOD TIME of the displayed waveform.
Part 6
Components used to PROVIDE a STABLE CRT DISPLAY
Part 7
Components used to SELECT scope TRIGGERING
Part 8
Components used to SELECT the scope's HORIZONTAL deflection system OPERATING MODE
Part 9
Components used to CALIBRATE the scope's PROBE
Part 10
Components used to ENERGIZE the SCOPE

Part 1

COMPONENTS USED TO DISPLAY THE WAVEFORM

Name	Function
CRT Display Screen . . .	. . .Displays signal
Vertical Graticules . .	. . Provide guide for amplitude measurements
Horizontal Graticules . .	. . .Provide guide for period time measurements

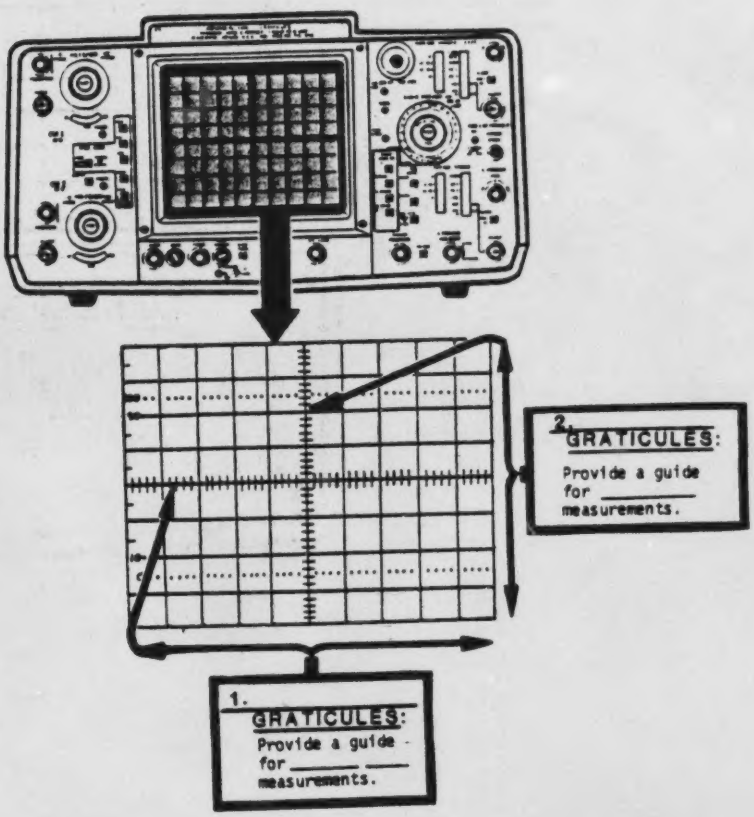
The CRT Display Screen displays the signal(s) applied to the vertical input connector(s) AND allows you to make accurate waveform measurements.



PRACTICE

PURPOSE:

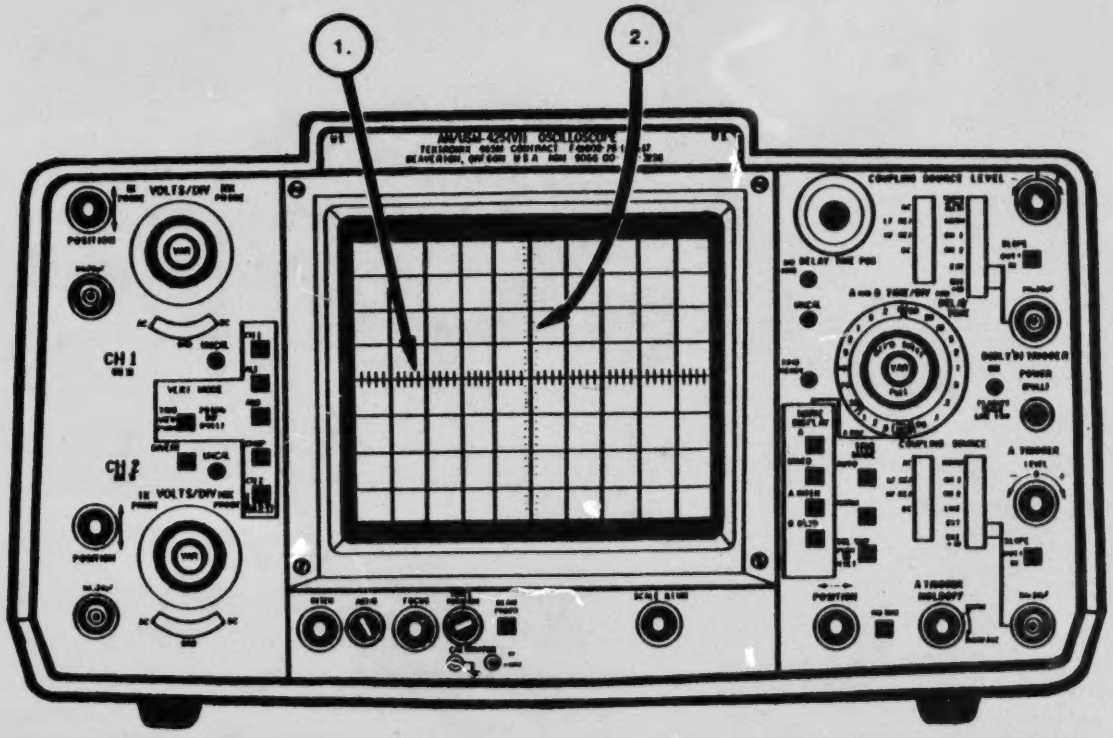
The CRT Display Screen displays the signal(s) applied to the _____ input connector(s) AND allows you to make accurate waveform measurements.



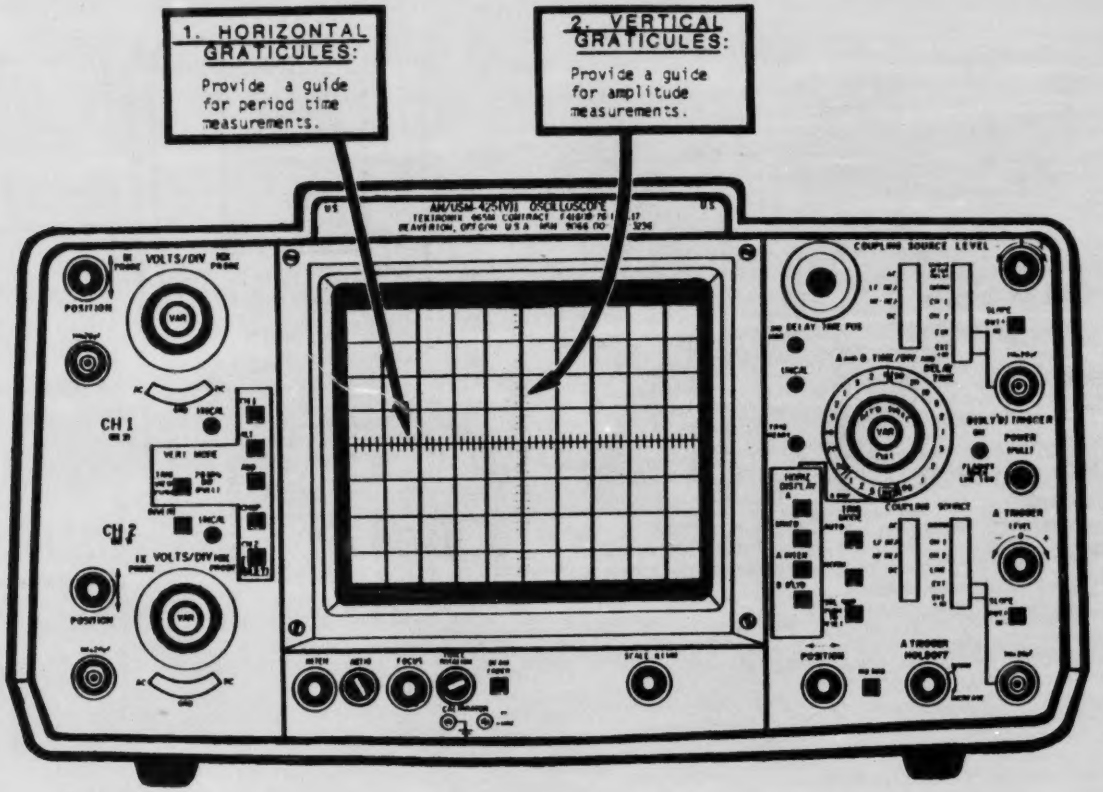
EXERCISE

For each component recall:

- **NAME**
- **FUNCTION**

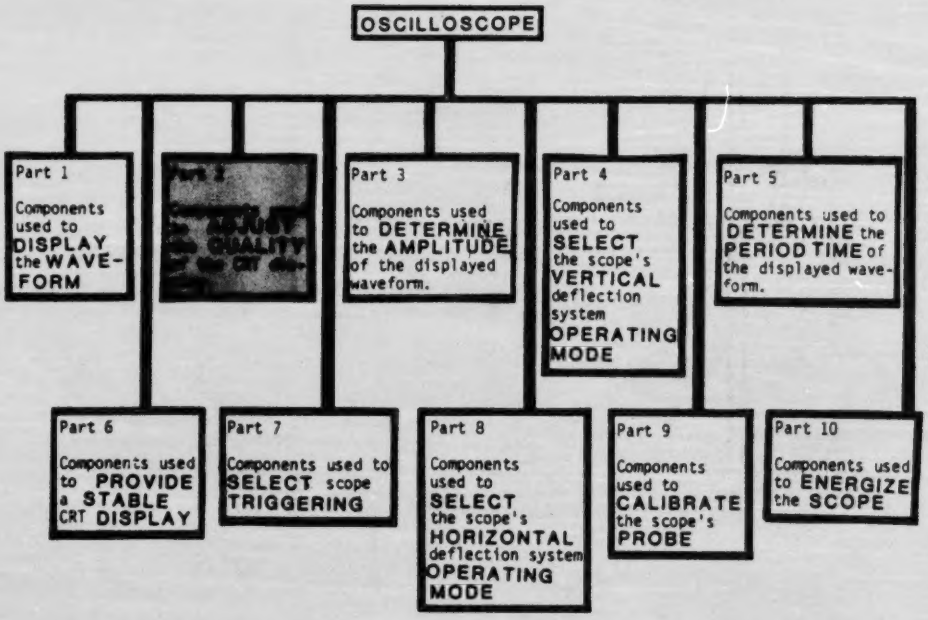


EXERCISE FEEDBACK


1. HORIZONTAL GRATICULES:
Provide a guide for period time measurements.
2. VERTICAL GRATICULES:
Provide a guide for amplitude measurements.

GENERALITY HELPS

NOTE:
The below diagram lets you see where you are in your study of the fundamental components of the scope.


OSCILLOSCOPE
Part 1
Components used to DISPLAY the WAVE-FORM
Part 2
Part 3
Components used to DETERMINE the AMPLITUDE of the displayed waveform.
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Part 5
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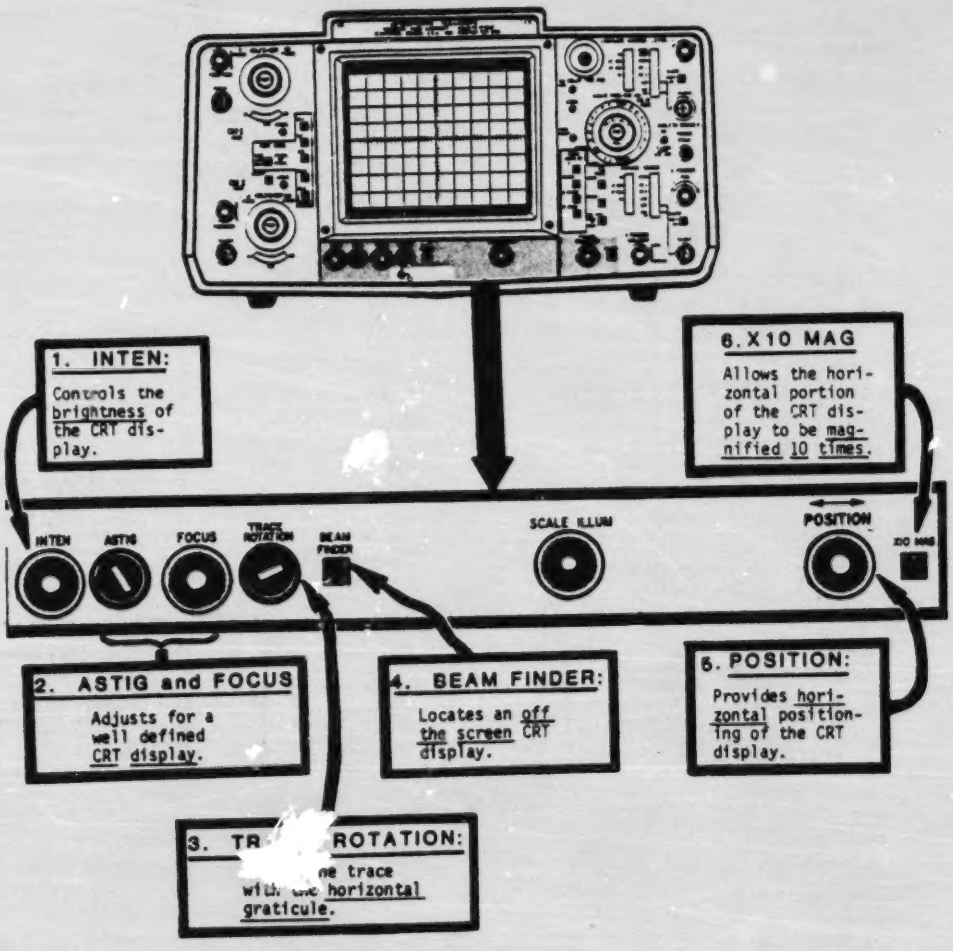
Part 8
Components used to SELECT the scope's HORIZONTAL deflection system OPERATING MODE
Part 9
Components used to CALIBRATE the scope's PROBE
Part 10
Components used to ENERGIZE the SCOPE

Part 2

COMPONENTS USED TO ADJUST THE QUALITY OF THE CRT DISPLAY

Name	Function
INTEN.	. Controls brightness of display
ASTIG & FOCUS. . . .	. Adjusts for well defined display
TRACE ROTATION	. .Aligns trace with horizontal graticules
BEAM FINDER	. .Locates an off-the-screen display
POSITION	. .Provides left-right positioning of display
X10 MAG	. Allows the horizontal portion of display to be magnified 10 times

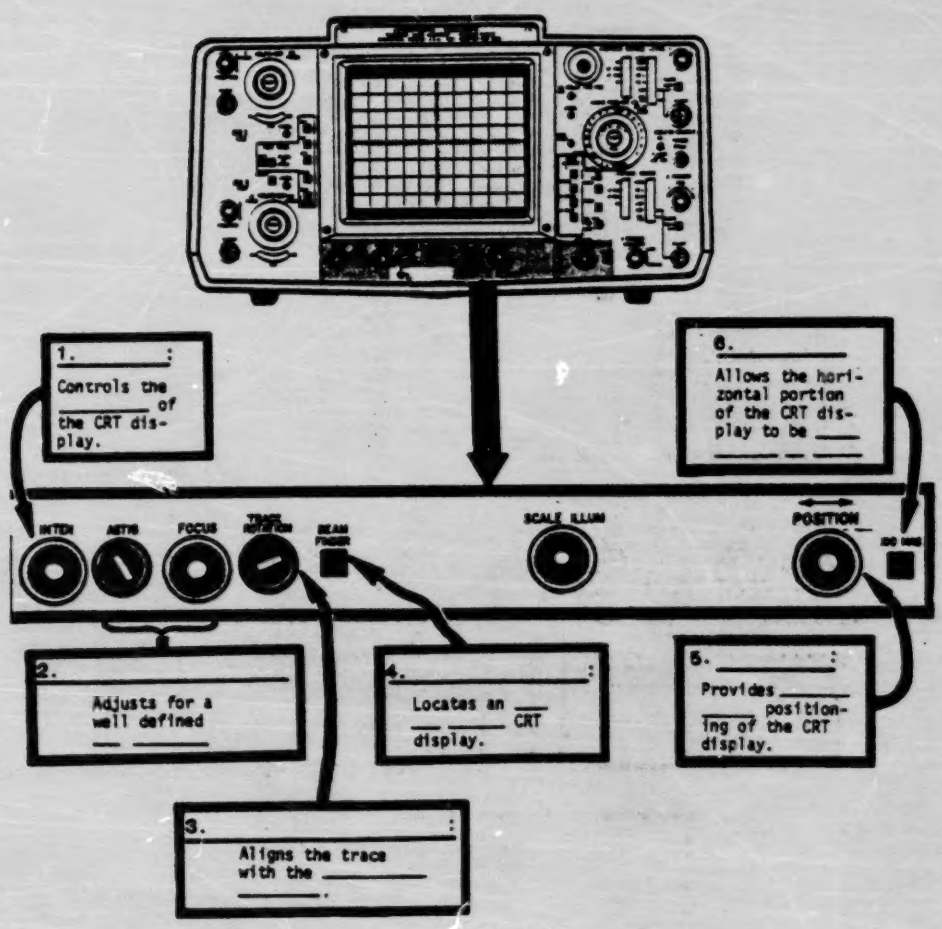
The CRT controls allow you to adjust the quality of the CRT display.



PRACTICE

PURPOSE:

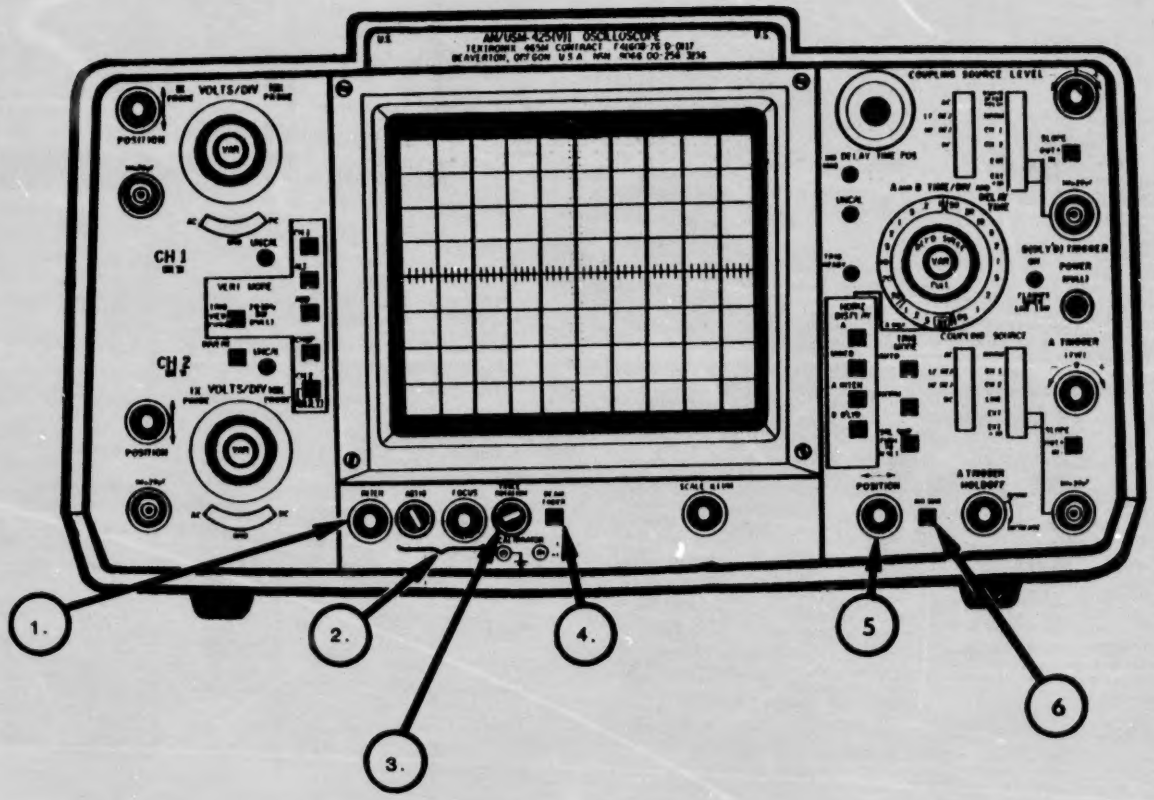
The CRT controls allow you to adjust the _____ of the CRT display.



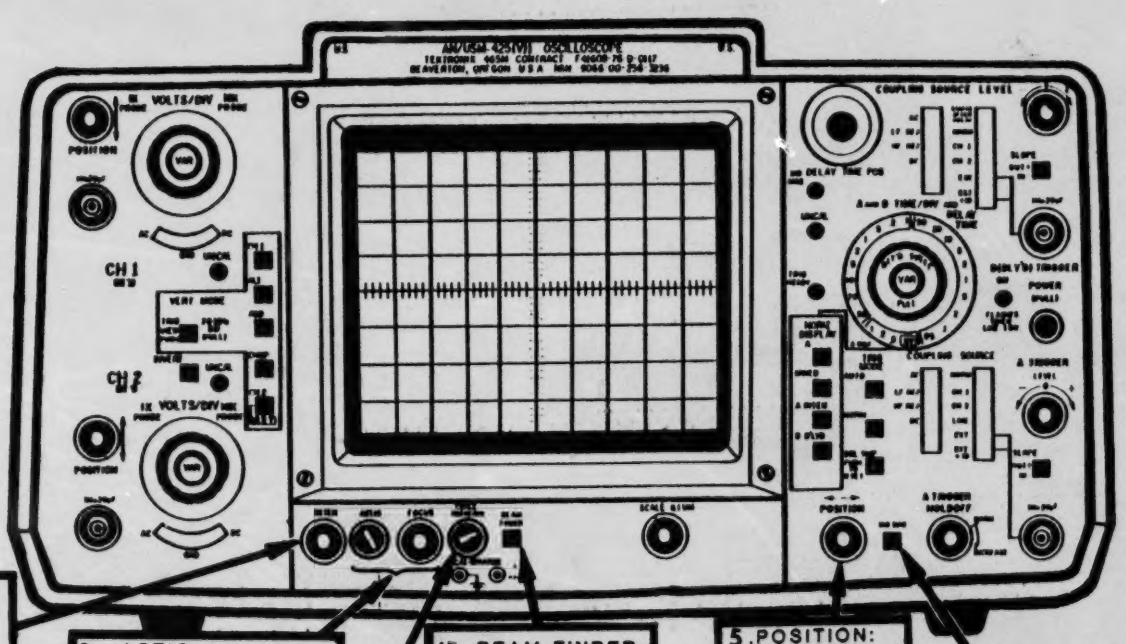
EXERCISE

For each component recall:

- NAME
- FUNCTION



EXERCISE FEEDBACK



1. INTEN:
Controls the brightness of the CRT display.

2. ASTIG and FOCUS
Adjusts for a well defined CRT display.

3. TRACE ROTATION:
Aligns the trace with the horizontal graticule.

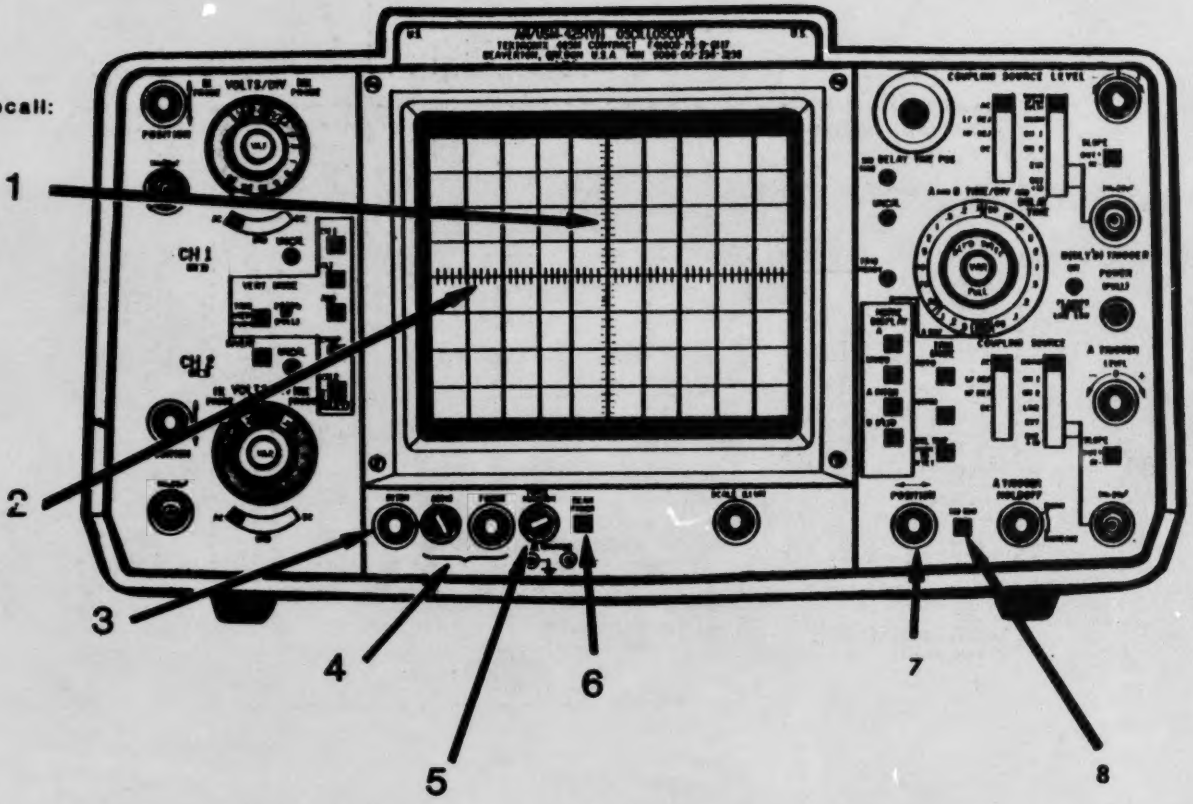
4. BEAM FINDER:
Locates an off the screen CRT display.

5. POSITION:
Provides horizontal positioning of the CRT display.

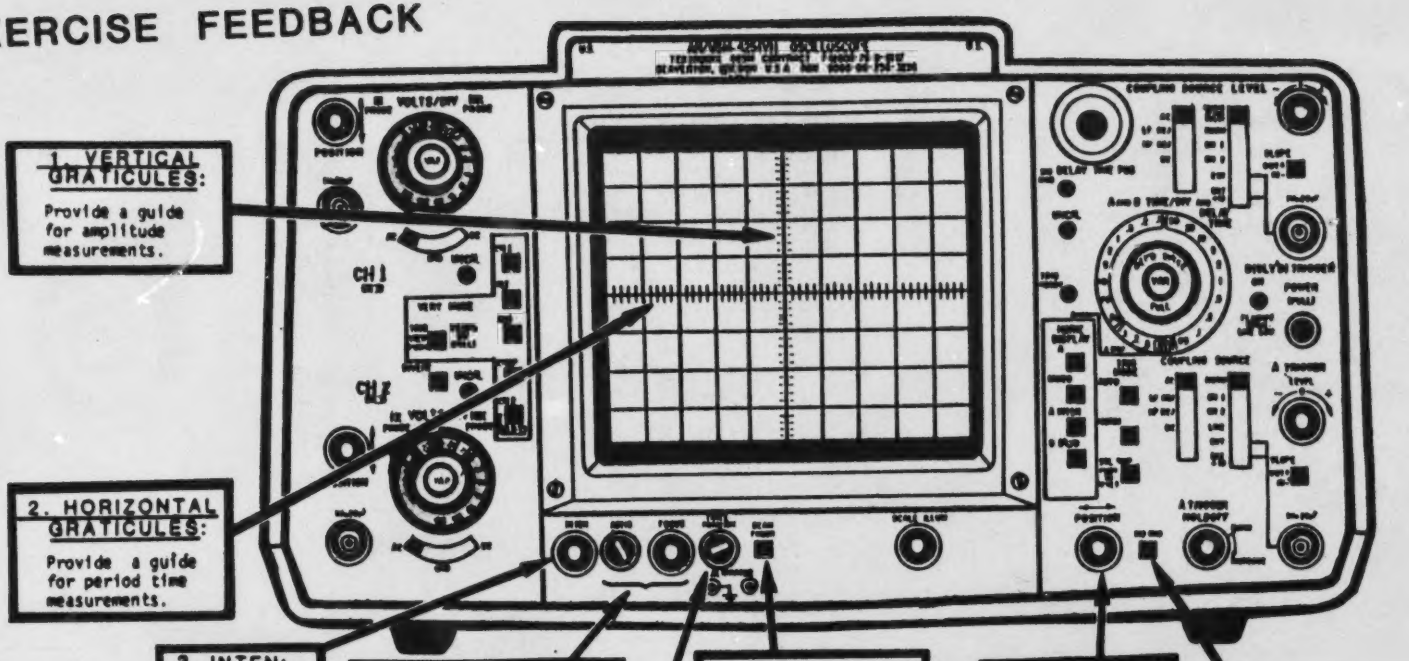
6 X10 MAG
Allows the horizontal portion of the CRT display to be magnified 10 times.

EXERCISE

- For each component recall:
  - NAME
  - FUNCTION

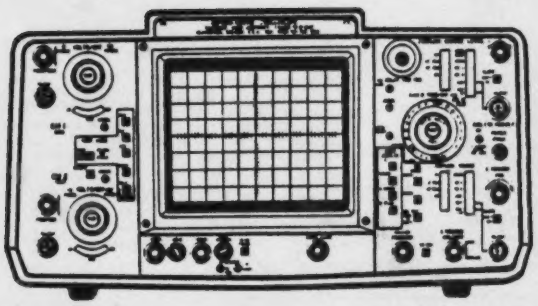


EXERCISE FEEDBACK


1. VERTICAL GRATICULES:
Provide a guide for amplitude measurements.
2. HORIZONTAL GRATICULES:
Provide a guide for period time measurements.
3. INTEN:
Controls the brightness of the CRT display.
4. ASTIG and FOCUS
Adjusts for a well defined CRT display.
5. TRACE ROTATION:
Aligns the trace with the horizontal graticule.
6. BEAM FINDER:
Locates an off the screen CRT display.
7. POSITION:
Provides horizontal positioning of the CRT display.
8. X10 MAG
Allows the horizontal portion of the CRT display to be magnified 10 times.

Section B

PROCEDURES



The following are the basic steps for using the AN/USM-425(V)1 oscilloscope:

- Preset oscilloscope controls
- Energize oscilloscope
- Obtain a high quality trace on the CRT display screen
- Calibrate the test probe
- Measure the amplitude of the waveform
- Measure the period time of a waveform

PRESET OSCILLOSCOPE CONTROLS

The procedure for presetting the oscilloscope controls is:

1. Rotate the vertical **POSITION** control to its midrange position
2. Rotate the **VOLTS/DIV** control to the 10X probe .2 position
3. Rotate the **VOLTS/DIV VAR** control fully clockwise
4. Shift the **AC-GND-DC** selector to the AC position....

PROCEDURE:
Using the AN/USM-425(V)1 oscilloscope here is what you must do....

NOTE:
The controls you are about to preset will ensure that you will obtain a sweep on the CRT with the least amount of difficulty.

1. ACTION:
Rotate the **POSITION** control to its midrange position.

RESPONSE:
The white dot on the rim of the knob is in the 12 o'clock position

2.ACTION:
Rotate the **VOLTS/DIV** control to the **10X** probe .2 position.

RESPONSE:
The 10X probe window reads .2

3. ACTION:
Rotate the **VAR** control fully clockwise.

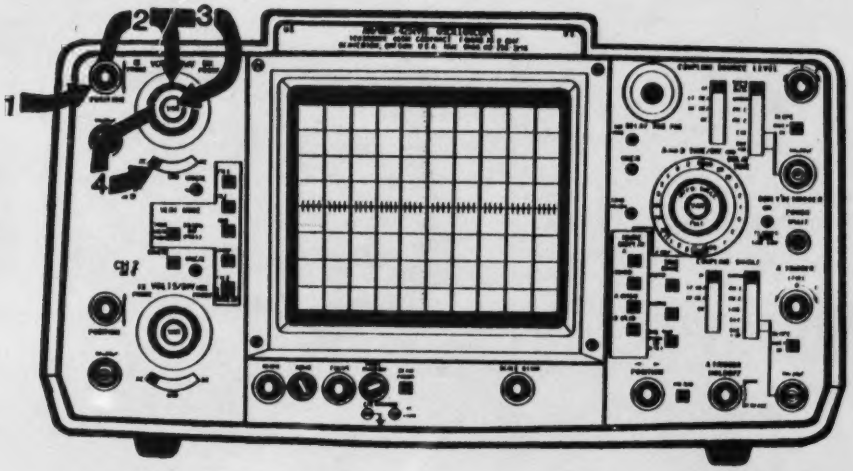
RESPONSE:
The red **VAR** knob has clicked into its detent and the **UNCAL** light is out. (when the scope is energized).

4. ACTION:
Shift the **AC-GND-DC** selector to the AC position.

PRACTICE

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation



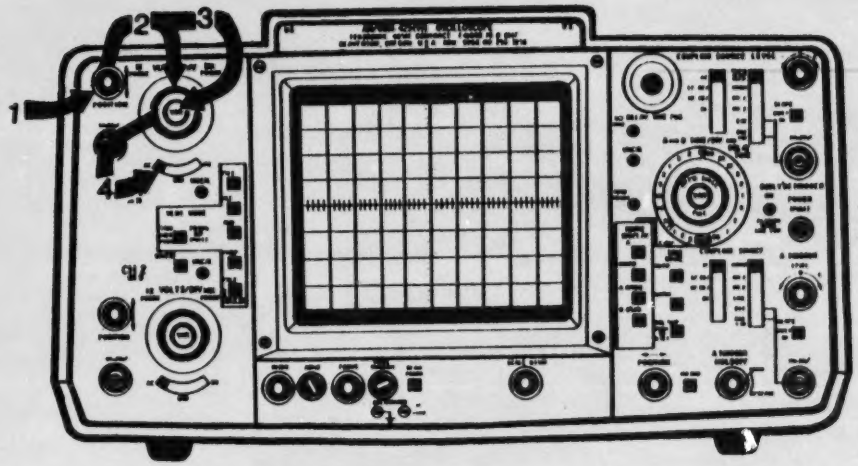
FEEDBACK

1. **POSITION** control to midrange position. White dot is in the 12 o'clock position.

2. **VOLTS/DIV** control to .2 in "10X window"

3. **VAR** control fully clockwise. Heard click. **UNCAL** light is "out" when scope is energized

4. **AC-GND-DC** selector to AC position.



GO TO PAPER MOCK-UP

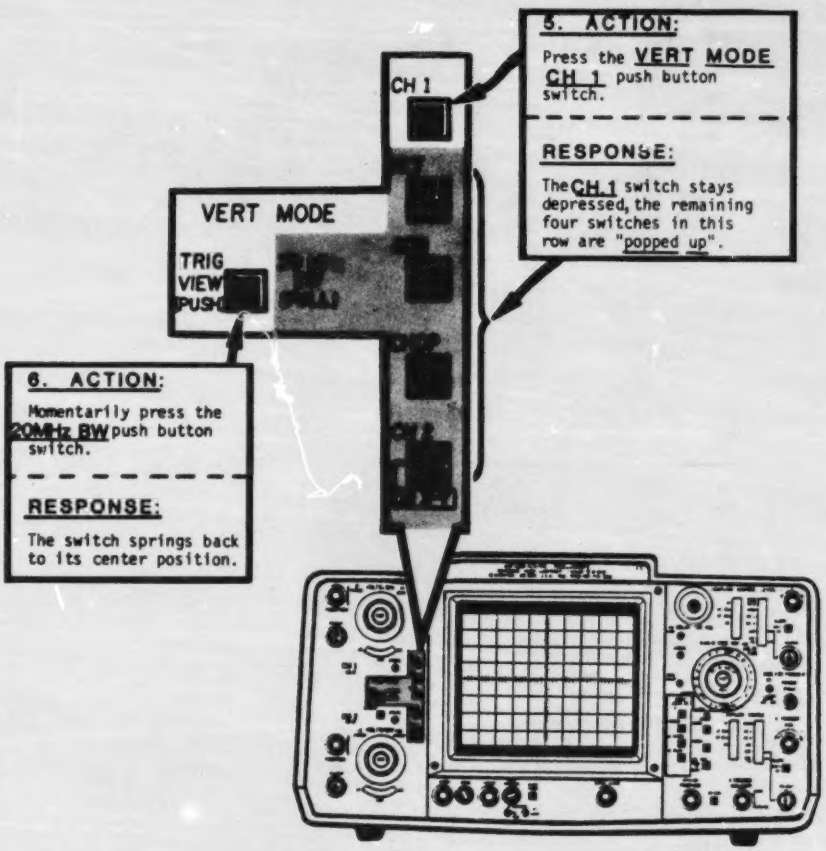
- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

PRESET OSCILLOSCOPE CONTROLS (cont.)

To continue the procedure...

5. Press the **VERT MODE CH. 1** push button switch
6. Momentarily press the **20MHz BW** push button switch...

PROCEDURE:
Using the AN/USM-425(V)1 oscilloscope, here is what you must do next...

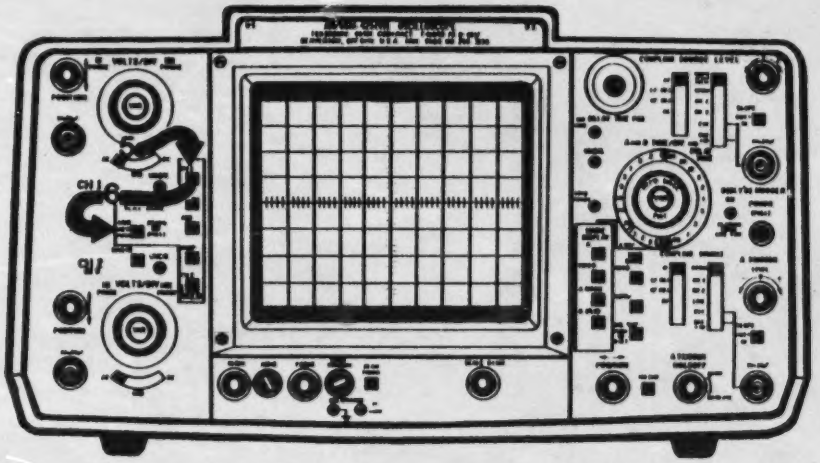

5. ACTION:
Press the VERT MODE CH 1 push button switch.
RESPONSE:
The CH 1 switch stays depressed, the remaining four switches in this row are "popped up".
CH 1
VERT MODE
TRIG VIEW PUSH
6. ACTION:
Momentarily press the 20MHz BW push button switch.
RESPONSE:
The switch springs back to its center position.

THEY ALL NEED
OSCILLOSCOPES

PRACTICE

ROAD MAP

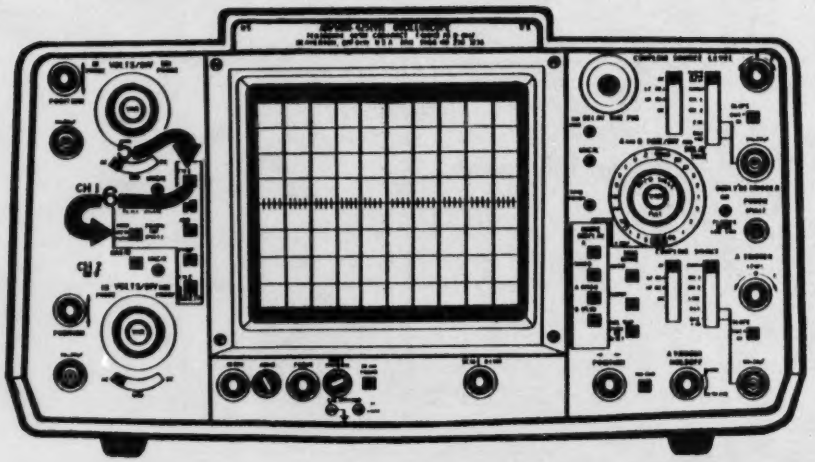
- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation



FEEDBACK

5. Push CH.1 switch "in". Other four switches are "popped-out".

6. Push 20 MHZ BW switch "in". Switch popped back "out".



GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

PRESET OSCILLOSCOPE CONTROLS (cont.)

To continue the procedure....

7. Rotate the A TIME/DIV control to the .2 ms position
8. Rotate the A and B TIME/DIV VAR control fully clockwise
9. Press the HORIZ DISPLAY "A" push button switch....

PROCEDURE:

Using the AN/USM 425 oscilloscope, here is what you must do next....

7. ACTION:

Rotate the **A TIME/DIV** control to the .2ms position.

RESPONSE:

The window of the outer dial reads .2ms

8. ACTION:

Rotate the **VAR** control fully clockwise.

RESPONSE:

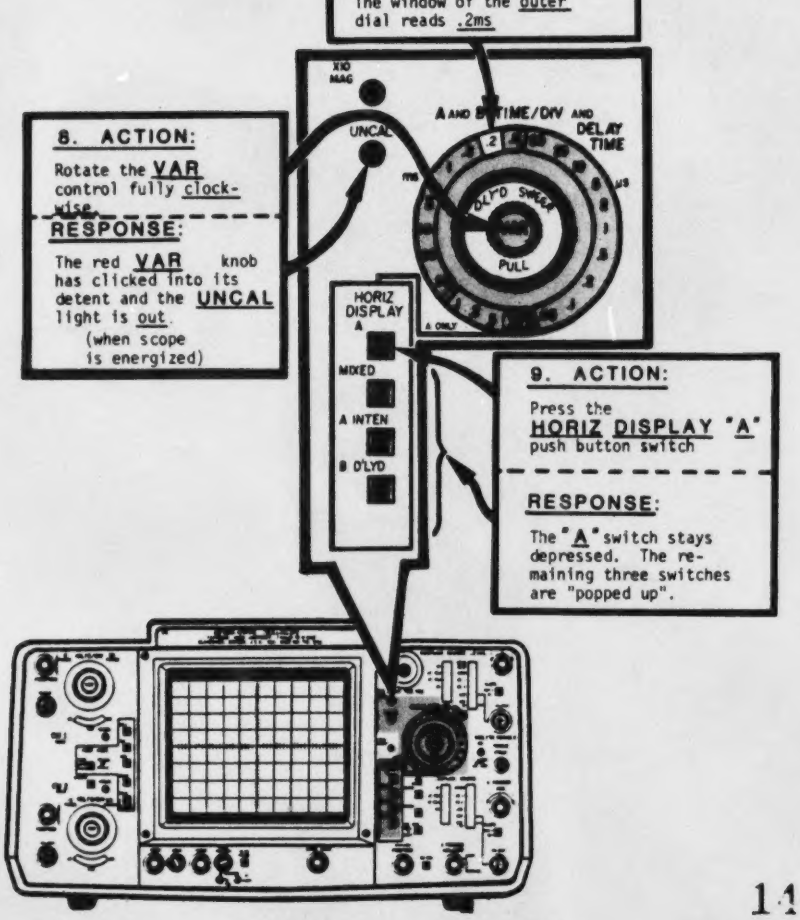
The red **VAR** knob has clicked into its detent and the **UNCAL** light is out. (when scope is energized)

9. ACTION:

Press the **HORIZ DISPLAY "A"** push button switch

RESPONSE:

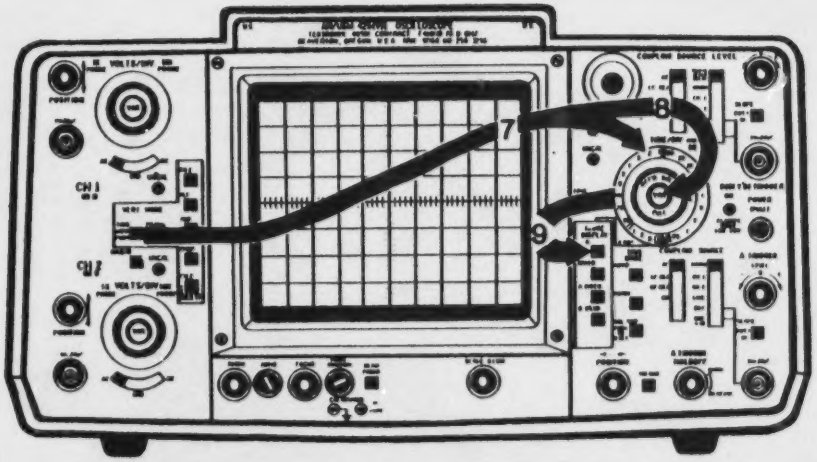
The "**A**" switch stays depressed. The remaining three switches are "popped up".



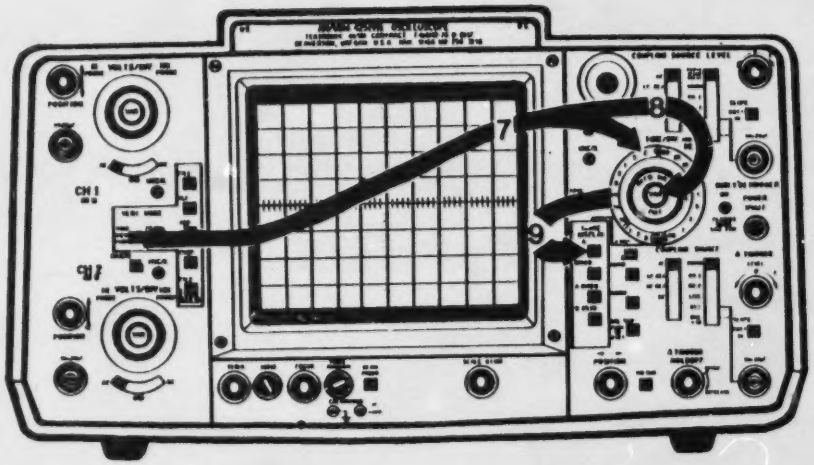
PRACTICE

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation



FEEDBACK



7. A TIME/DIV control to .2ms

8. VAR control fully clockwise. Heard click. UNCAL light is "out".

9. Push "A" switch "in". Other three switches are "popped-out".

GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

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PRESET OSCILLOSCOPE CONTROLS (cont.)

To continue the procedure....

10. Press the TRIG MODE AUTO push button switch
11. Shift the SOURCE selector switch to the NORM position
12. Rotate the "A" TRIGGER LEVEL control to its midrange position
13. Press the SLOPE push button switch to the + position
14. Place the "A" TRIGGER HOLD OFF control to the NORM position....

PROCEDURE:

Using the AN/USM 425 oscilloscope, here is what you must do next....

10. ACTION:

Press the **TRIG MODE AUTO** push button switch.

RESPONSE:

The **AUTO** switch stays depressed, the remaining two switches are "popped up".

11. ACTION:

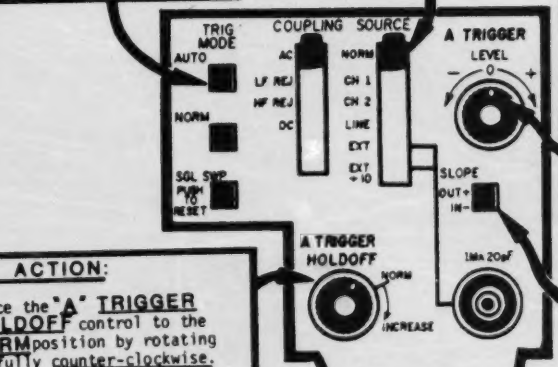
Shift the **SOURCE** selector switch to the **NORM** position.

12. ACTION:

Rotate the **"A" TRIGGER LEVEL** control to its mid-range position.

RESPONSE:

The white dot on the rim of the knob is in the 12 o'clock position.



14. ACTION:

Place the **"A" TRIGGER HOLDOFF** control to the **NORM** position by rotating it fully counter-clockwise.

RESPONSE:

The knob has clicked into its detent.

13. ACTION:

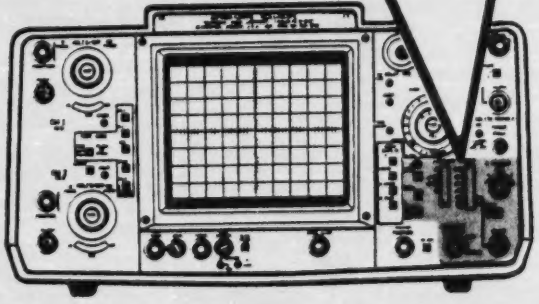
Press the **SLOPE** push button switch to the + position.

RESPONSE:

Switch is "popped up".

NOTE:

You may have to press the switch twice to cause it to "pop up".

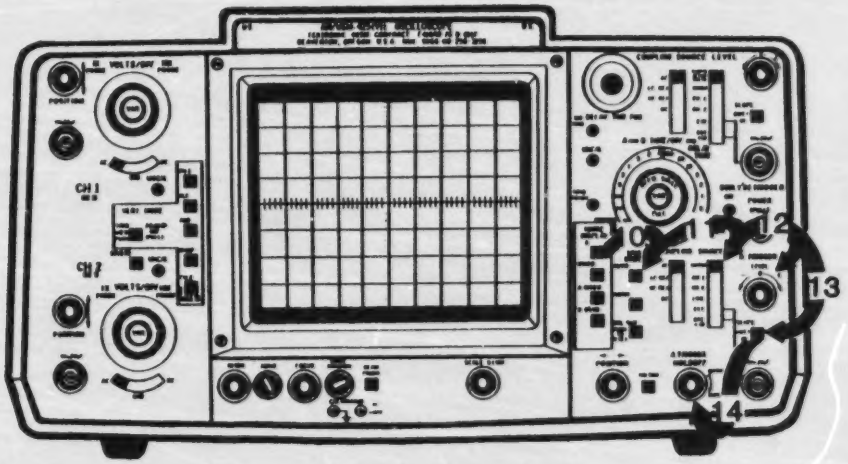


...The Only Thing
Between You
and The Deep Six!

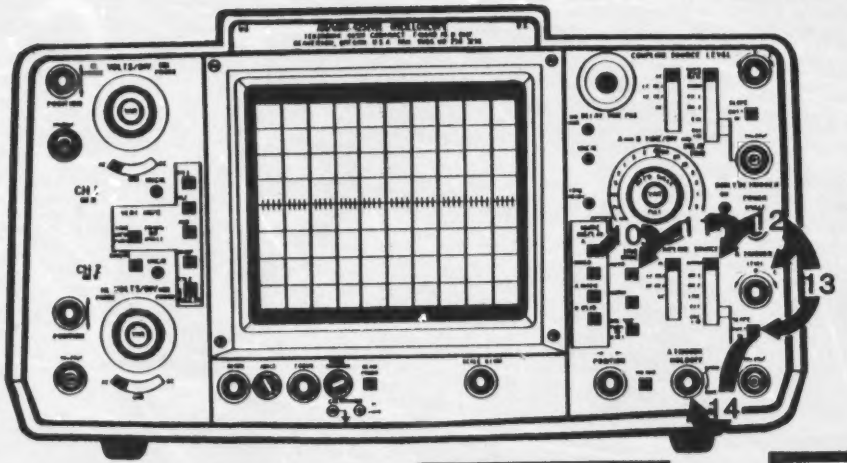
PRACTICE

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation



FEEDBACK



10. Push **AUTO** switch "in". Other two switches are "popped-out".

11. **SOURCE** selector to **NORM** position.

12. **A TRIGGER LEVEL** control to mid-range position. White dot is in 12 o'clock position

13. Push **SLOPE** switch to + position. Switch is "popped-out".

14. **A TRIGGER HOLDOFF** control fully clockwise. Heard click.

GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

PRESET OSCILLOSCOPE CONTROLS (cont.)

To continue the procedure....

15. Press the X10 MAG push button switch to "OFF"

16. Rotate the horizontal POSITION control to its midrange position

PROCEDURE:

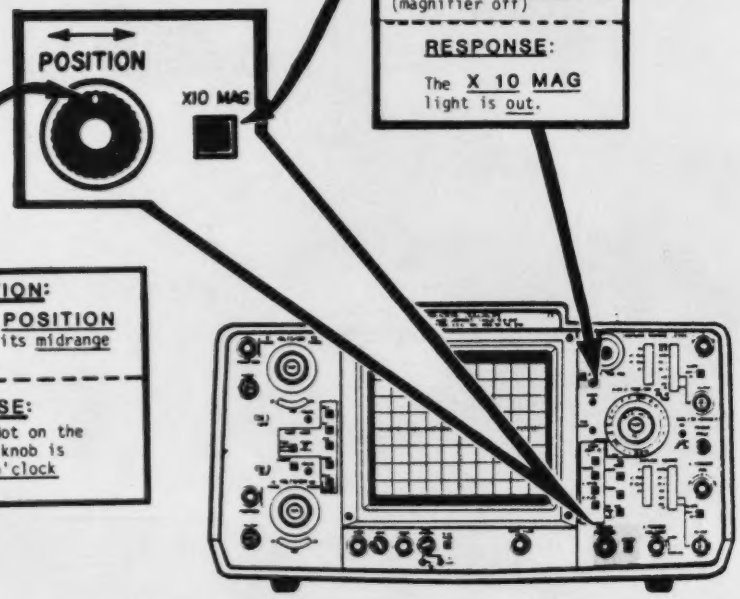
Using the AN/USH 425 oscilloscope, here is what you must do next.....

15. ACTION:

Press the **X10 MAG** push button switch until the switch is "popped up" (magnifier off)

RESPONSE:

The **X 10 MAG** light is out.



16. ACTION:

Rotate the **POSITION** control to its midrange position.

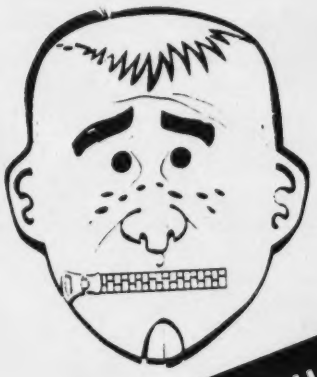
RESPONSE:

The white dot on the rim of the knob is in the 12 o'clock position.

CONCLUSION:

The oscilloscope controls are now preset to provide a trace when the scope is energized.

GOT A SAFETY SUGGESTION?



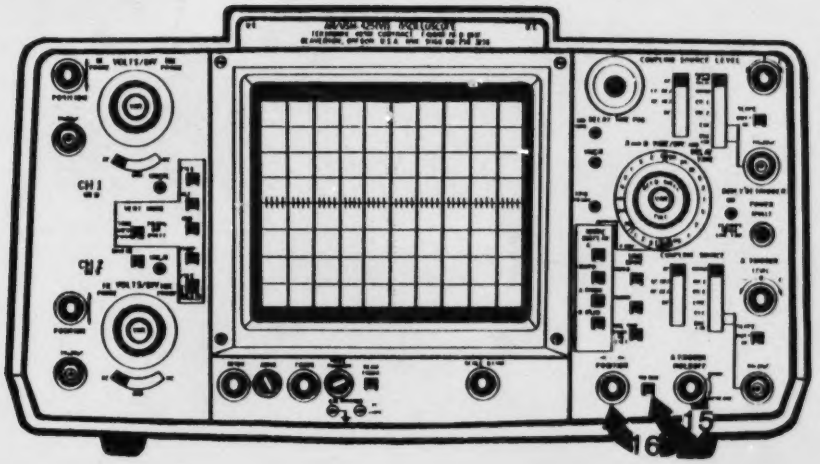
Don't keep it to yourself!

U.S. Naval Safety Center,
NAS, Norfolk, Virginia 23511

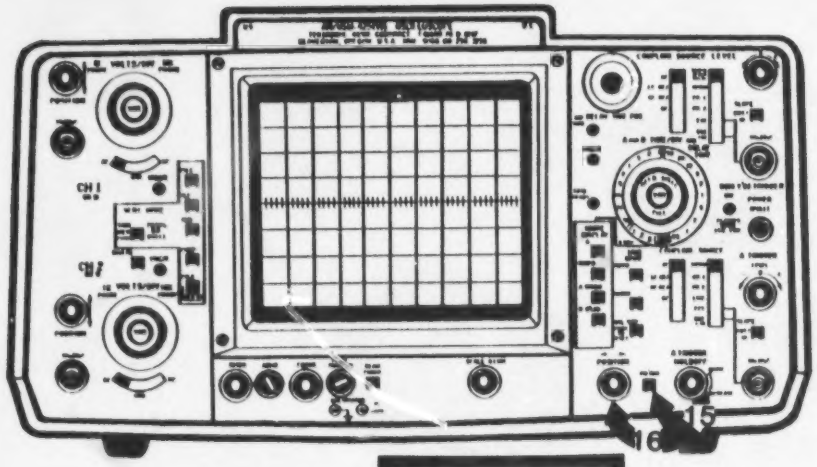
PRACTICE

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
- Look up answers if you need help
- Keep practicing until you can describe steps without error or hesitation



FEEDBACK



15. Press **X10 MAG**nifier "off". Switch is popped "up". **X10 MAG** light is "off".

16. **POSITION** control to mid-range position. White dot is in 12 o'clock position

GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

PRACTICE

ROAD MAP

- With your finger, trace the steps
- Recall (1) how to perform, (2) systems response
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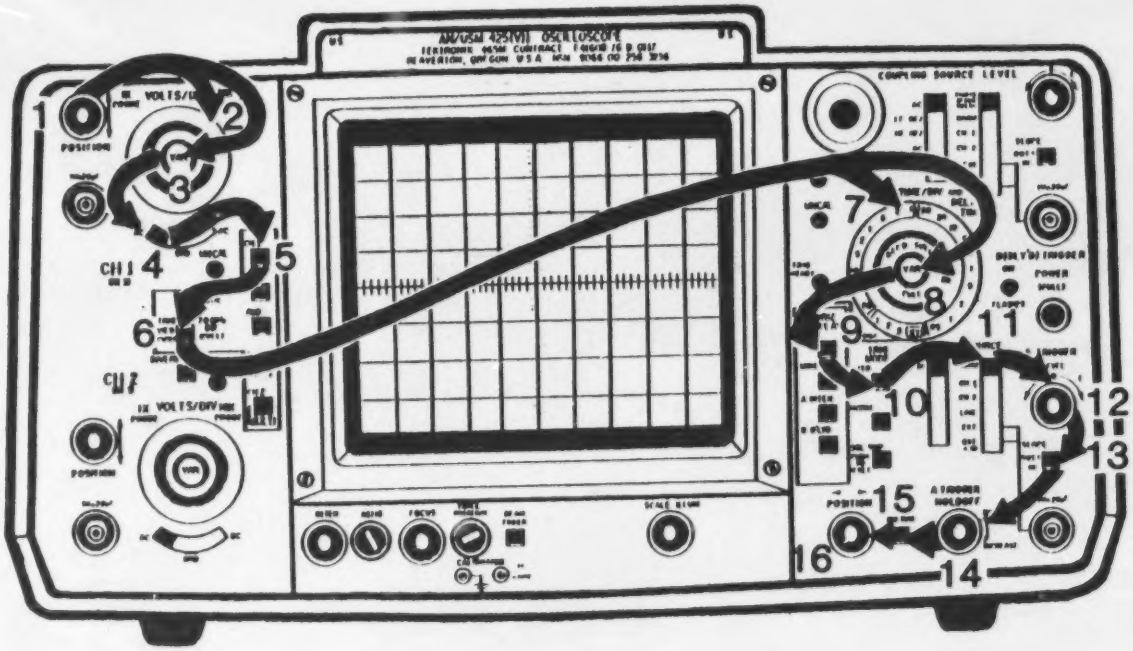


FEEDBACK

1. **POSITION** control to midrange position. White dot is in the 12 o'clock position.

2. **VOLTS/DIV** control to .2 in "10X Window"

3. **VAR** control fully clockwise. Heard click. **UNCAL** light is "out".

4. **AC-GND-DC** selector to AC position.

5. Push **CH 1** switch "in". Other four switches are "popped-out".

6. Push **20 MHZ BW** switch "in". Switch popped back "out".

7. **A TIME/DIV** control to .2ms

8. **VAR** control fully clockwise. Heard click. **UNCAL** light is "out".

9. Push **A** switch "in". Other three switches are "popped-out".

10. Push **AUTO** switch "in". Other two switches are "popped-out".

11. **SOURCE** selector to **NORM** position.

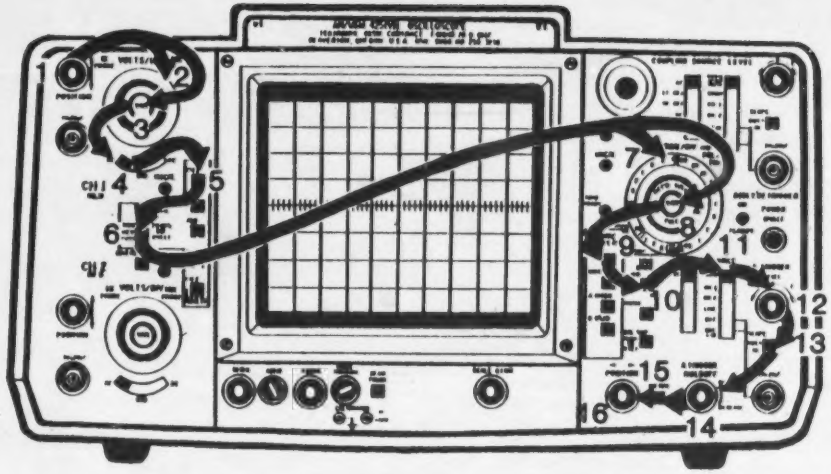
12. **A TRIGGER LEVEL** control to mid-range position. White dot is in 12 o'clock position

13. Push **SLOPE** switch to + position. Switch is "popped-out".

14. **A TRIGGER HOLDOFF** control fully counter-clockwise. Heard click.

15. Press **X10 MAG**nifier "off". Switch is popped "up". **X10 MAG** light is "off".

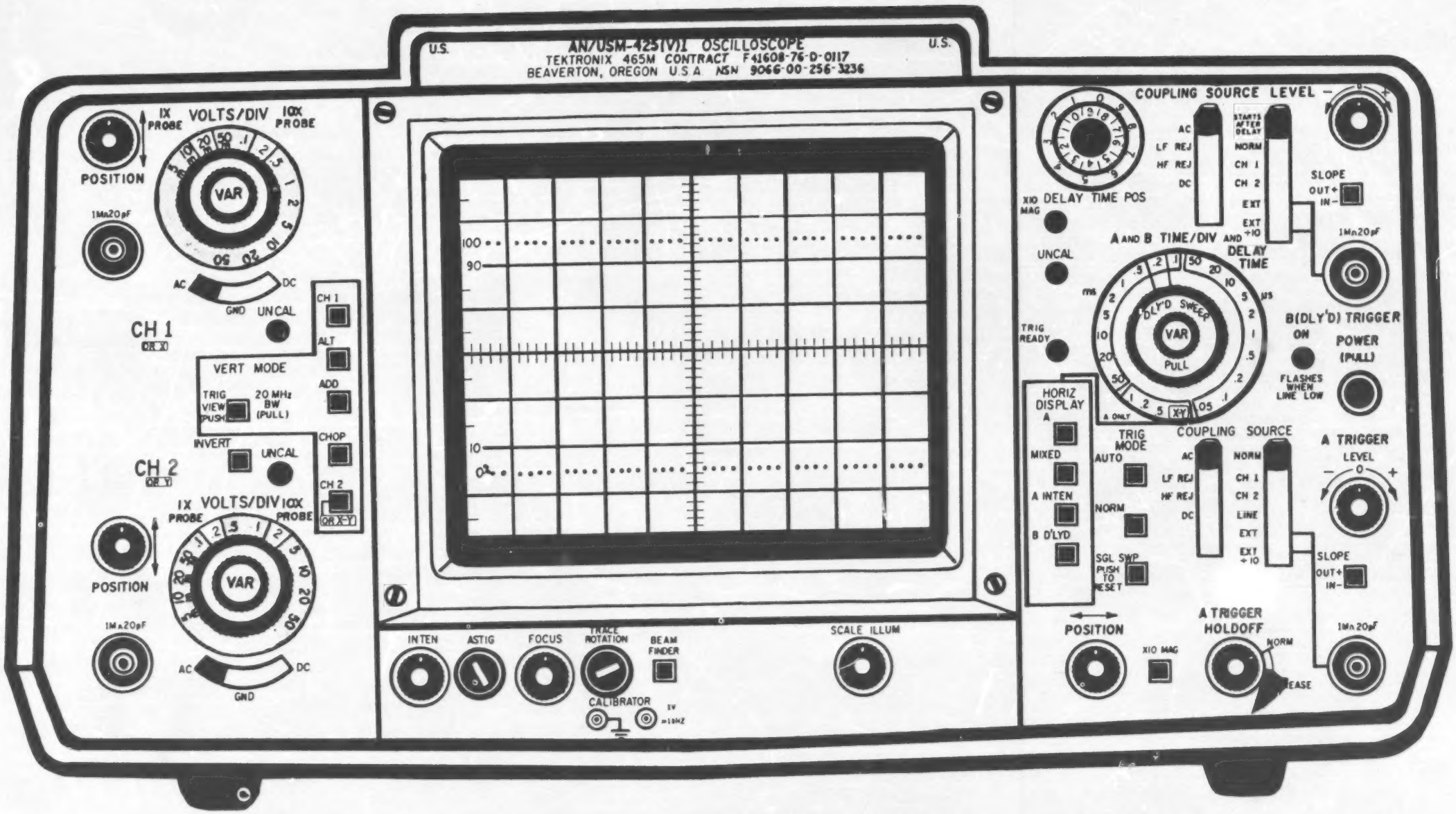
16. **POSITION** control to mid-range position. White dot is in 12 o'clock position



GO TO PAPER MOCK-UP

- Step through all items
- Touch where each action and response takes place
- Recall exact action for each item

PAPER MOCK-UP



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